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THE NATIONAL LEPROSY FUND.

PRESIDENT—H.R.H. THE PRINCE OF WALES.

PRIZE ESSAYS ON SUBJECTS CONNECTED WITH LEPROSY.

REPORT

ON THE CONDITIONS UNDER WHICH
LEPROSY OCCURS IN

CHINA, INDO-CHINA, MALAYA, THE ARCHIPELAGO, AND OCEANIA.

COMPILED CHIEFLY DURING 1894.

BY

JAMES CANTLIE, M.A., M.B., F.R.C.S.,
HONG KONG.

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LEPROSY IN CHINA, INDO-CHINA, MALAYA, THE ARCHIPELAGO, AND OCEANIA.

The following is the notice which led to this Report :—

(*'British Medical Journal,' January 13th,* 1894.)

"The National Leprosy Fund.

* * * * * *

"4. On the prevalence of leprosy in the islands of the Pacific, and the supposed exemption of certain groups.

"5. On the conditions under which leprosy at present prevails in China, Cochin-China, Batavia, and the Malay Peninsula.

* * * * * *

"10. The best essay on any subject connected with leprosy."

This Report refers to Nos. 4, 5, and 10, and is sent in as fulfilling all the conditions for the three Essays.

THE PLAN ADOPTED TO GAIN INFORMATION.

The method adopted to obtain information consisted—in the issue of a notification of the desire of the National Leprosy Fund; an accompanying circular and post-card; and a schedule of questions to be answered.

The issue was made in two languages, English and French. The great difficulty of the inquiry consisted in the enormous area of the globe over which information had to be gathered. The 'Journal' containing the intimation of the National Leprosy Committee did not reach Hong Kong until the end of February, 1894, and as the replies had to be in London by January 1st, it meant that my report had to be despatched a month previously, leaving me but nine months for work. It was impossible in many instances to ensure the circular reaching its destination in the time allowed, let alone the replies. At many islands in the Pacific a boat calls once in six months, and, unless the reply was ready in a day or two, another six months before a reply even started on its return journey must intervene. Many of the schedules came in during 1895, and even as late as the autumn of that year much valuable information was communicated.

For the guidance of future inquirers in this field, it is well at the outset to point out a grievous error. In the schedule I forgot to ask the very necessary question, "Is there any leprosy in the district?" In consequence of this serious omission many sent no reply until a second communication was made, when a letter of regret was received, stating that "I am sorry I cannot help in the inquiry, as there is no leprosy in the district." Leprosy is very far from being universally distributed, even in China, where most people believe it is a present evil in well-nigh every province. A second error was that the question of the practice of vaccination was not put more definitely. The question ought to have been, "Is vaccination practised? If so, how long has it been introduced, what proportion of the people have been vaccinated, and whence is the lymph derived?"

The total number of replies received far exceeds my most sanguine expectations, and the report actually covers the region mentioned in the request made by the National Leprosy Fund, enormous as that is.

I can only thank those who have supplied information, and the blame lies with myself if, from the excellent materials at hand, a report of scientific value is not assured.

COPY OF THE CIRCULAR SENT TO COLLECT INFORMATION UPON LEPROSY IN THE FAR EAST, 1894.

Inquiries.

1. State the physical features of your district, noting elevation, distance from sea, condition of soil, cultivation, rainfall, &c., and density of population.

2. Distribution.—Is leprosy more commonly met with amongst dwellers in plains or hills?

3. Heredity.—Do the natives believe in hereditary transmission?

4. Contagion.—Do the natives believe leprosy to be contagious?

5. Food.—Is fish or other food assigned as a cause?

6. Segregation.—Is it observed? if so, how?

7. Tuberculosis, Syphilis, and Malaria.—Do you observe any connection between leprosy and any one of these?

8. Vaccination.—Has leprosy increased with the use of vaccination?

9. Treatment.—What do you find the best? Do you know of any reputed native drugs?

GENERAL REMARKS.

The attempt to stimulate medical men to record their experience of leprosy in various parts of the globe is only one of the conceptions which redounds to the credit of the National Leprosy Committee Fund.

The Report of the Indian Leprosy Commission was useful in many ways. Amongst other points elucidated, it helped to furnish an estimate of the approximate number of lepers in proportion to the population. Outside Western Europe and North America there is nothing more difficult to arrive

at than the number of lepers relative to the population ; and the very indefiniteness of the number serves but to increase the mystery and actual dread of the disease. Not that the result of the work done for the Committee tends to lessen the precautions against the spread of the disease by allaying the public mind with assurances that only a fraction of the community are attacked ; far other is the aim of the present endeavour. It is meant to develop a sustained attempt to eradicate leprosy ; but it is necessary in the first instance to ascertain the habitat of the disease before further steps are taken, and it is to elucidate this essential point in the investigation now in hand that I have ventured to undertake an inquiry.

The most recent work of any magnitude on leprosy is contained in Davidson's excellent book on 'Hygiene and Diseases of Warm Climates.' At page 433 is found the following statement :—"Leprosy exists throughout the whole of the empire of China." If my inquiry has done nothing more than to prove this statement to be false, it will be of considerable value. That the assertion is false is to be gathered by even a casual glance at the text, for it will be read, and read with interest, that not one-third of China is under the ban of leprosy.

The task I have undertaken is classed under two headings in the list prescribed by the National Leprosy Committee for special inquiry and report. Of course the attempt was made because I have had opportunities of acquiring knowledge in several of the countries mentioned. I cannot pretend to personal acquaintance with more than a fraction of the regions ; they are so wide apart, of such enormous extent, and bear a population of no less than one-fifth of the human race. Added to this, also, is the great difficulty of obtaining information of even meagre exactitude from such a country as China, where a species of social order and an old-world habit defies the inquiries of the foreigner.

China delights in throwing dust in the eyes of all who would probe the records of her past, and cloaks her ignorance in the belief that she will thereby establish a renown for wisdom.

The knowledge to be gained from the Chinese is that of the individual. At most it extends to mere family tradition, and in no branch of knowledge is this more evident than in that of medicine. The Chinese medical man has no training; his potions and nostrums are secrets composed by himself or bought from some unscrupulous person who, more frequently than not, sells a false receipt. He belongs to the most illiterate class, and his own statement of cures is the only capital he possesses. It is evident, therefore, that inquiry amongst such a class of men is useless, is likely to lead one astray, and is calculated to teach one to reject their statements upon any scientific subject with unfeigned contempt.

Throughout the Malay Peninsula, throughout the Dutch Indies—Java and Sumatra—the same holds good. There also exist people of ancient name, and who, proud of their antiquity, think to protect themselves from the penetrating glance of science beneath the family tree of pedigree, and under the glamour of past deeds of mystical renown.

This is the reason why it is to Europeans settled in the districts named that I have applied for information. The native can tell nothing beyond his immediate ken; the power of generalisation is unknown to him; his Government does not require it, nay, strangles any attempt to develop it. It will be seen that the persons appealed to are doctors in general practice, missionary doctors, consuls, mission bodies, customs commissioners, and others scattered throughout the length and breadth of the Far East.

Of 383 appealed to, 75 sent in reports; many are short, several lengthy, and a few are full reports. All are valuable, all worthy of record; and the concise reply of "no case known" is perhaps the fullest of all.

I am grieved to say that I have nothing new in the way of cure to report. The same reply comes, "alleviation but no cure," from all corners of the Far East; the West echoes the same; and as through all the dim centuries, so at the close of the nineteenth, civilised and uncivilised man confront each other with the canker of incurable leprosy in their midst.

THE CIRCULAR.

A copy of the circular issued from Hong Kong to gather knowledge of leprosy in the Far East and the Pacific Islands was sent to the following :

Place.	No. of circulars sent.	No. of replies.
China	186	40
Cochin-China	60	3
Corea	23	4
Philippines	3	2
Fiji	7	1
Hawaiian Islands	3	3
Samoa Islands	2	1
Society Islands	2	0
Tonga Islands	1	1
New Hebrides	3	1
Hervey Islands	1	1
New Britain	1	1
New Guinea	2	1
New Caledonia	1	1
Straits Settlements	28	7
Burmah	7	0
Siam	3	2
Java	18	2
Sumatra	19	3
Borneo	13	1
Total	383	75

Out of 383 queries, 75 replied—a very good response, and many more than I anticipated.

Printed circulars, as a rule, do not command the attention the senders would wish, let the subject be what it may. With this before me, I am astonished at so many replies, and it only tends to show how great a number of persons take interest in leprosy and the leper.

CONCLUSIONS.

The conclusions arrived at from the study of the evidence brought forward in the following report are—

1. Leprosy is a specific disease, bearing a close analogy, ætiologically and bacteriologically, to tuberculosis, amounting in some points to identity.

2. It is not proven that leprosy is diffused by hereditary transmission, but the evidence is not strong enough to prove that it may not be so distributed.

3. Leprosy may arise in a leprous country independently of personal contagion.

4. Leprosy is to be feared as an inoculable disease, but there is no direct proof that it is such.

5. Vaccination is not believed by any natives of the Far East to be a factor in the spread of leprosy, except in a few cases where the idea has been suggested by Europeans.

6. Inoculation of smallpox is a common practice throughout China, but the geographical distribution of leprosy is totally independent of the frequency of the practice.

7. Leprosy in the Far East is centred in the south-eastern provinces of China—Kwantung and Fokien.

a. Three-fourths of the coolie emigrants from China are from these provinces, and the spread of leprosy in the Malay Peninsula, the Dutch, Spanish, and Portuguese East Indies, and in Oceania is in all cases coincident and concurrent with the residence of coolies from these provinces.

b. In no instance over this vast area has any native race acquired leprosy, except where Chinese coolies have settled.

c. There seem to be no native names for leprosy in the aboriginal languages, except in Malay, over the area named, though there are loan words.

d. The aborigines ascribe leprosy to the Chinese immigrants, and in several cases the name used shows the belief in the Chinese origin of the disease.

e. Leprosy disappears in some countries with the departure of the Chinese coolie, as in North Borneo.

8. The distribution of leprosy is independent of any geological, geographical, or climatic conditions.

9. Overcrowding, poverty, and bad food, but especially the first, render the individual susceptible to leprosy.

10. The eradication of leprosy is to be effected by improving the hygienic conditions of the centres of leprosy.

11. Leper villages, by which is meant quarters set apart

for lepers to find shelter in, but from which they can go at will to beg in the public streets and engage in work, do not show beneficial results as regards the check of the disease.

12. The British Government would be conferring a great service to humanity were a closer inspection of Chinese emigrants travelling by British ships insisted upon. The shipping lines of other countries, especially German, might be invited to co-operate.

13. The British Government, with the co-operation of the French, German, Spanish, Dutch, and Portuguese, the powers holding the important possessions in the Far East and Oceania, to which Chinese emigrants flock, might effectually check, or at least arrest, the spread of leprosy by a monthly inspection of coolies on plantations, in coolie quarters, and wherever Chinese congregate.

14. Deportation, and not segregation, is the proper method of dealing with the Chinese leper in (to him) foreign countries.

15. Segregation of Chinese lepers in an asylum in any country free of leprosy will in time render that country a fresh focus of leprous infection.

16. The great traffic centre of Hong Kong ought to be rigorously dealt with as regards leprosy by the colonial Government. In the meantime lepers beg in the streets, live in coolie quarters, and dwell in secluded spots in several parts of the island. In seven years, 1888–95, a minimum calculation shows from 600 to 700 lepers to have been, unknown to the Government, in the island of Hong Kong.

NOTES ON THE QUESTIONS AND ANSWERS.

Question I.—*State the physical features of your district, noting elevation, distance from sea, condition of soil, cultivation, rainfall, &c., and density of population.*

That the physical features of the area of inquiry would be many and various may be guessed when even a cursory glance

is taken at an ordinary map. From the Amoor River in the north to the island of Java in the south includes the region between Siberia in the north and Australia in the south; or, to put it more exactly, between latitudes 53 N. and 5 S., and between longitudes 100 E. and 140 E. From north to south the region measures 4000 miles, and from east to west about 2500 miles, and bears a population of 600,000,000. The enormity of the area and the population renders it beyond the powers of one man in a lifetime, far less in the nine months available, to collect with exactitude information respecting the haunts and habits, the treatment, and the social ethics of the leper.

To deal with the physical features of the continent of Asia facing the Pacific Ocean is beyond my power; but, fortunately, I can command the skill of an expert of the foremost rank. Mr. S. B. J. Skertchly, F.G.S., F.A.I., late of H.M. Geological Survey, is at present (1894) located in Hong Kong, and with the zeal of a true scientist has undertaken the task. Hence the report is from his pen (see special article and maps).

Question II. *Distribution.—Is leprosy more commonly met with amongst dwellers in plains or hills?*

The answers are chiefly from dwellers on plains, and the report of leprosy amongst hill-dwellers is mere hearsay. Dr. MacDonald (Fatshan) writes, "More common in plains, but extends along the waterways into the hill country as far as Shin Kwan." Dr. Vinton (Corea) says, "Corea is practically all hills," and records but one case of leprosy seen during a four years' sojourn. At Gensan, on the east coast of Corea, Dr. Hardie saw no case in fifteen months; but again in Fusan, in the south, Dr. Tata Shima says it is frequent; he saw twenty cases in two years. From the Malay Peninsula, Dr. Gundry Fox (Perak) writes, "Commoner on plains; never heard of a case in hills, but evidence is scanty." Mr. Wheatley (Johor Bharu): "Said to be very common among Jakuns in hills." These are the only statements as regards hill lepers in the collection of evidence. It is very meagre,—due, no doubt, to want of observation. Corea is a seeming exception, but the

Corean does not dwell in the hills, he is too lazy to ascend an elevation of any sort; he grubs in the valleys and maintains a livelihood by the least possible amount of exertion. There is nothing of the hardy mountaineer in his lazy phlegmatic composition. Corea is really a country of hills and fertile well-watered valleys; the Coreans dwell in the valleys; there are no elevated people-bearing plateaus. Mr. Wheatley's evidence, he says, is only hearsay.

This report, therefore, brings no data to light whereby the question of the distribution of leprosy according to elevation of residence can be decided.

Question III.—*Do the natives believe in hereditary transmission?*

Out of the nineteen places reported on, fourteen state that the natives believe in heredity, and five give a negative answer.

Now there is a great difficulty in settling this point with natives. The people, as a whole, believe in heredity in the abstract, but the leper himself denies it in point of fact. No Chinese leper, of those I have seen, allowed that either father or mother or any relation had leprosy, nor will a leper voluntarily state that his child is leprous. Where, then, lies the truth? A visit to a leper village ought to settle the matter. A visit to the leper village at Canton, where lepers are allowed all freedom of cohabitation, and free ingress and egress, would be the one place, apparently, to declare positively once and for all whether heredity was a real factor in the disease. But here one is met with by a flood of opinion in another direction. *The third generation is without leprosy,* say the inhabitants; a fine healthy child is shown at the breast of a leprous mother, without blemish or stain. Children in the village are shown at all ages without marks of leprosy, and no imported leper allows that any of his ancestors had leprosy. On the other hand, leper children ageing from seven to fifteen are seen with leprosy developing; but the leprous parent takes a cheerful view of the fact, because they are under the belief that the children of such will not be leprous. I saw only one grandchild of leprous parents in the Canton

village, and certainly he was not affected; but that proves nothing. The child was only in arms, and leprosy might not develop until puberty, and certainly not before the third year.

It will be observed that this question receives an answer as regards native opinion only. The question really annuls the private opinion of the inquirer, and sets forth only the opinion of the native. Perhaps this was wrong, but the belief amongst Europeans so negatives the probability of heredity, that the matter seems scarcely worth inquiring into further. Leloir, almost alone, maintains that leprosy is directly hereditary, and all inquirers in the subject of leprosy have written his opinion down. Moreover, after the result of the inquiries into the subject by the Leprosy Commission in India, the question may be regarded as settled; and although I agree with the conclusion come to by the Commission that "leprosy is not diffused by hereditary transmission," in the present state of our knowledge it is perhaps better put that "leprosy is not proven to be diffused by heredity." The attempt to elicit from the natives what their belief is, in regard to the hereditary influence of leprosy, affords evidence of no scientific value. Their belief is for the most part that leprosy is handed down from parents to their children. A parallel inquiry carried out in any civilised country, as regards the heredity of, say, cancer or phthisis, would obtain the belief of the public, but it would not in all probability agree with the scientific opinion. As children born of leper parents are brought up under the same roof, and suckled by a leprous mother, contagion comes into the question, and it is difficult to disassociate contagion from heredity.

Question IV. *Contagion.—Do the natives believe leprosy to be contagious?*

Under this heading the subjects of infection, sexual intercourse, and inoculation are discussed.

Infection.—The spread of leprosy by casual exposure to the disease does not require serious consideration. No one, except impressionable women, ascribes any dread of passing a leper in the street. No mere touch or brush

against an infected person is ever seriously entertained as a means of acquiring the disease. When a leper appears in an out-patient room he is not particularly avoided, and when he quits his seat another person will not hesitate to occupy it. Before the new-comer sits down, in all probability he will fan the place where the leper sat; but that is all the precaution taken against infection. Nor did I ever observe any hesitation on the part of Chinese students examining leper patients. The present-day belief, throughout the world generally, is summed up in the action of the Chinaman when he *fans the seat* just vacated by a leper before occupying it himself. In other words, infection is not regarded as playing a part in the spread of leprosy.

Sexual intercourse is believed by the majority of Chinese as a potent factor in the spread of leprosy. On many occasions I have had a leper patient confess that he had connection with a leprous woman. The man at the time did not know that the woman was a leper, otherwise he would have rigidly avoided her. There is a belief, prevalent in Canton and elsewhere, that a leprous woman can rid herself of the disease by having connection with a healthy man. Leper women, it is well known, will come out in the dusk in the hopes of seducing a man to have connection with them. They select the evening or night so that their condition may not be observed. By connection they hope to get rid of the disease by handing it over to the man. Besides, there is a still more curious belief prevailing, namely, that sexual intercourse will act as a prophylactic against leprosy, and in the following manner:—A woman has a leprous husband; she may not have any signs of the disease upon her, but as a preventive to infection she will try to get a healthy man to have connection with her, so that she may hand over the disease to him, and thereby lessen her chance of becoming affected at all. This is termed "selling off leprosy," and is a very common practice in Canton.

Men who affirm that they acquired leprosy by sexual intercourse are most positive in their statements that the disease manifested itself in two to four months after the date of connection. It may be that the man had acquired

syphilis, as the date he gives of the appearance of signs coincides with the time secondaries manifest themselves. None of the cases, however, I examined, by whom sexual intercourse was stated to be the initial cause, showed any signs of syphilis.

In conclusion, the present state of our belief may be held to be that "sexual connection is a means of spreading leprosy." As a corollary it may be added, that even a single coitus when abrasion occurs may be sufficient to convey infection of leprosy.

Contagion. — Excluding sexual intercourse, leprosy is communicated from the diseased to the healthy only after prolonged and intimate contact. Few Chinese exclude their relatives from their home unless leprosy has advanced so far that the leper becomes objectionable, either from the smell emanating from his sores, or from the unsightly appearance of his face or limbs. Not only is this the case with the Chinese, but I have known more than one case of leprosy in a European family, dwelling in the East, in which a leper member of the family was kept in seclusion until death occurred. In one family the husband became a leper—in this instance avowed to be the result of a single coitus with a leper woman,—but he continued to reside at home, with the result that his daughter, an only child, developed leprosy when she attained the age of ten. The husband was at one time a resident in Singapore, but when leprosy was advanced he came to England. His wife was afraid to attend him, but his daughter—then a child of six—administered to his wants, rubbing in various ointments and applications which he had obtained in the East. He never called in an English doctor, in case his disease should submit him to separation from his family. Yet another case occurred not so very long ago. An old resident in the Far East had a "boy"—a personal servant—in whom he put trust, and to whom he had a great attachment. Whilst in his service the "boy" developed leprosy, yet his master kept him in his service. The two frequently travelled together by sailing-boat—a Chinese junk—and the master and his "boy" were frequently and intimately associated—so intimately, in fact, that when the weather was

cold the two used to sleep beneath the same blanket, even after the "boy" had become a pronounced leper. Subsequent to the "boy's" death leprosy attacked the master, thereby adding yet another instance of the effect of prolonged contagion as a means of spreading leprosy.

Question V. *Food.—Is fish or other food assigned as a cause?* This question was asked in order to obtain information anent Mr. Jonathan Hutchinson's statement concerning fish diet as a cause of leprosy. The result of the inquiry cannot annul that statement, as in the course of the inquiry no people have been described with whom fish did not at some time form part of the diet. Few people have lived to maturity who have not consumed fish in some form. No religious sect that I have heard of disallows a fish diet. Vegetarians we know of; but they become so after maturity, and only when dyspepsia or sentiment gets the upper hand. We often hear it stated that negroes live on pumpkin, that the Chinamen live on rice, and many loose statements of the kind. I can at once positively declare that the Chinese do not prefer—nay, cannot live on—a rice diet. No coolie considers that he has had a proper meal unless both vegetables and fish or pork are supplied. Fish, fresh, raw, salted or rotten, comes not amiss to him, and he thinks he is badly used unless he gets it, be he a dweller by the sea or far inland. On the other hand, the Bajows of Borneo live almost entirely on fish; yet there is never a leper amongst them. The question may be reduced to a paradox: All consumers of fish are not lepers, but all lepers have consumed fish. There the question must be left.

Salt.—The absence of salt from the diet for any length of time is held to be a factor in the development of leprosy; and in India the rise and fall in price of rice is popularly believed to play a part in the appearance of the disease. The explanation of such a belief is easily enough interpreted. When any form of food is scarce, especially such an essential as salt, latent leprosy will speedily show itself; and persons, before they were deprived of the food in question, were perhaps never suspected of being lepers.

The two chief sources of salt in China are the salt wells in Sze-chuen, and the salt mills near Taku at the mouth of the Pei-ho river. The former may be considered the southern, and the latter the chief northern source. Now at first sight it would seem as if there might be something in the theory, for are not Kwang-tung and Fokien maritime provinces far removed from the salt regions? On looking more carefully into it, however, cause and effect are not so pronouncedly linked. It is true the hot-bed of leprosy, namely, Kwang-tung (Canton) and Fokien provinces, are between 2000 and 3000 miles removed from the salt sources; and in the neighbourhood of the Pei-ho river, the district whence salt is exported to the provinces mentioned as most leprous, no leprosy exists. Further, there is a salt tax in China, which no doubt tends to make the people look upon salt as a luxury more or less. Sea carriage from even Taku, or far-away Sze-chuen by river, is a very cheap transit in China; and the salt tax is not so heavy as to deprive the fairly well-to-do of the article. That the poor classes may be stinted at times there can be no denying. On the other hand, consider the salt supply of Manchuria; the salt has to be carried from the Pei-ho near the sea-coast, first by boats up the river, and then on camels' backs many days journey beyond the Great Wall—an expensive and somewhat precarious source, yet there is no leprosy met with in Manchuria. The deprivation of salt cannot, therefore, be considered to hold good in China as a cause of leprosy; although the want of salt in the diet of leprous people will no doubt hasten the development of the symptoms of the disease.

Question VI. *Segregation.—Is it observed? if so, how?*

By segregation is meant the voluntary or compulsory dwelling together of lepers. Isolation is often used synonymously with segregation; but isolation implies a complete retirement. Complete isolation is not known. The inhabitants of even the most strictly kept leper hospital are in daily contact with the healthy—be they medical men, nurses, attendants, servants, or clergymen. No leper community is in this sense isolated from the world. It may fairly be taken

as a proof that leprosy is a severe scourge in any district when a leper settlement is found attached to it; and it may be taken as an act of self-protection, or a mark of higher civilisation on the part of the inhabitants, that has induced them to establish the home. The word "home" perhaps best expresses the nature of the settlement, for it must not be imagined that a leper village is, in China, in any sense a hospital. They are not isolation asylums, but merely refuges, whence lepers who have not the strength to earn their bread may dwell. Nor is the idea this statement conveys quite true, for the majority are mendicants who daily go forth to obtain alms. They are to be met with in shops, in the streets, on the river,—everywhere, in fact, these dwellers in the village mix with the bustling crowd, handle the food exhibited for sale, and pay the cash they carry in their leprous hands. The village they dwell in serves merely as a hot-bed of leprous infection, and the disease will remain endemic so long as these nests of infection are maintained.

Compulsory segregation is practised by the Portuguese in Macau; that is to say, no leper is allowed to be about in the town or to dwell in Portuguese territory. Lepers must either leave the colony or they are seized and sent to the leper island, where a settlement is provided for them by the Portuguese government. Here we have, perhaps, as near an approach to complete isolation as can be attained; a separate island, a separation of the sexes, and no visitors except the doctor very occasionally, and the clergyman once a month.

The effect of such a segregation as that practised at Macau upon the prevalence of leprosy affords no conclusive evidence one way or another, as the colony is so open to the inroad of lepers from China that removal of a few to the asylum but creates a vacancy for another leprous mendicant.

At the present day the feeling is against compulsory segregation, and in favour of voluntary "homes." Were these made comfortable, not only would the leper's friends wish to send him there, but the leper himself would be attracted towards a retreat where he would be free from the gaze of his fellow-man.

QUESTION VII.—*Do you observe any connection between malaria, tuberculosis, or syphilis with leprosy?*

The relation of *malaria* to leprosy has been a burning question, nor is the belief quite dead. The provinces of Kwang-tung, Fokien, and Shan-tung are the most malarial, at the same time the most leprous. Again, England, when highly malarial, was also leprous. On the other hand, we find leprosy in many cases without malaria, and malaria without leprosy. The Chinese, however, do associate humid and low-lying damp localities with leprosy, and maintain that the association is no mere coincidence, but actually a cause of the disease. This statement does not imply that leprosy is a sequence of malaria, but that they arise from a common cause. That the one is no protection from the other is evident from the fact that many lepers suffer from malarial fever. The effect of drainage upon the disappearance of malaria is a well-established fact; whether or no it has a similar effect upon leprosy cannot be answered. On the west coast of Borneo, where the cultivation of rice necessitates a constant swampy condition of the soil, no native lepers are to be found. The present state of knowledge is, therefore, that no connection is made out between malaria and leprosy, nor can a climate which propagates the one be entertained as a cause of the other.

Syphilis.—No doubt many cases of leprosy and syphilis are confounded, and many of the wonderful "cures" claimed by native practitioners are cases of syphilis. I do not think this is a fitting occasion to enter into the discussion as to whether leprosy is a mere phase of syphilis. To my way of thinking, the two diseases are quite apart; and that neither is a protection from the other.

Tuberculosis.—This question is so interesting that I have ventured to express my views under a separate heading. Here I will let the subject pass, merely remarking that the bacilli are well-nigh if not wholly identical. On this basis leprosy may be discussed as a phase of tuberculosis.

QUESTION VIII. *Vaccination.—Has leprosy increased with the use of vaccination?*

At the first glance at the subject one would imagine that

in China we had a magnificent field to study this question. Closer investigation, however, will show that such is not the case, for we have to take inoculation into the argument, and the subject becomes more complicated straight away. Inoculation with the virus of smallpox was introduced into China as early as the eleventh century. It was first practised in the province of Sze-chuen, the knowledge of its power being learned from Central Asia. From Sze-chuen (see map) the practice travelled all over China. Not that inoculation was ever systematically enforced, but it was and is still extensively employed as a protection against smallpox throughout the length and breadth of China.

Vaccination was introduced into Canton in the year 1801, the lymph being brought from India by the traders of the East India Company for the purpose. The vaccine matter originally introduced is in use still, and has been humanised many scores of times. It is doubtful whether vaccination as practised by the Chinese with their attenuated lymph affords any protection at all. The arm-to-arm method is exclusively followed, the use of calf lymph not being understood by the Chinese. The vesicles raised by Chinese methods are of the most bastard description—a small attenuated mockery of a scab; but the Chinaman goes through the form without once thinking of the result. The art and not the science alone concerns him.

Children alone are vaccinated—adults never. There is no re-vaccination practised. With such a condition of things one would expect smallpox to be rife, and so it is. Smallpox is for ever present, and severe epidemics are the rule. Now we never find leprosy in babies under two years of age, and it is before that age that most are vaccinated. Therefore, for vaccine matter to be a carrier of the leprous bacillus, it is plain that we must believe in the inheritance of leprosy; or in what other way can we account for the transmission of the disease? The belief in the heredity of leprosy is scientifically dead, and to "the hereditary tendency of the tissues" no one has ever added an inherited bacillus. To the anti-vaccinators this line of argument gives no loophole, so I must supply them with one. Leprosy is most rife in the provinces of Kwang-tung and Fokien, and

it was in these very provinces vaccination was first introduced. Can anything be more conclusive? But what are the facts? Leprosy has actually *diminished* in the town of Canton since vaccination came in. Formerly there were two leper villages where now there is only one, and it contains fewer lepers than did either of the previous hospitals. In many parts of the province leper retreats are met with where the inhabitants are not leprous, but they still draw the leprous allowance granted by government. Further, in the seventeenth century the French mission had a hospital where some 800 inmates resided, but now only a very few (two or three) seek shelter there. They have not gone elsewhere, as they are not to be found in fresh leper villages, and indeed, we know one such village has actually disappeared. Leprosy is not on the increase in Canton and district, and the pretty argument I made out for the anti-vaccinators has fallen to pieces. No Chinaman voluntarily attributes to vaccination any implication that it is responsible for the spread or maintenance of leprosy. This is a great fact to establish, as no more astute observers exist than the Chinese; and with a foreign custom under trial there are no more conservative, not to say biassed, people. Those that know the Chinese are well aware that a mere sentiment will bring discredit upon any "foreign" practice, however salutary.

Question X. *Treatment.—What do you find the best? Do you know of any native drugs?*

To enumerate the various means of treatment reported would be to rewrite the communications of each contributor, as every district has something in the way of special treatment to record. The fact is, that leper patients, if looked after and fairly well fed, improve without medicine or special treatment of any kind. Ten cents' worth of food daily will do more than medicines, although iron and cod-liver oil help materially.

In the records of Indian investigation, it is to be regretted that when specifics, so called, are being tried, that collateral evidence is not forthcoming as to the diet on which the leper subsisted. That good food and clothing will not only

prolong a leper's life, but apparently stay the advance of the disease, is abundantly proved. In the leper villages of which I have any knowledge, the head man is invariably the longest liver. He is always the best clad, the best fed and the richest man of the leper community. These conditions are the natural outcome of one another; because he is the head man he becomes rich, and the other conditions follow. The answers to my questions cover the knowledge of treatment acquired by one-fifth of the human race, and there is nothing new to tell. Many customs and many drugs are recorded, but their incertitude is the best evidence of their being ineffectual. Some of the methods are more of the nature of incantations than of rational procedure. From Amoy we have it "that the leper is enclosed in the carcass of a freshly eviscerated bullock, where he remains an hour or more." A snake, the flesh of a dead child, a cooked placenta (human) are amongst the edibles lauded by the Chinese. Perhaps the most extraordinary method of all is the "selling off leprosy" by sexual intercourse, practised by women in and around Canton (see Contagion). What does the information amount to? 1st. That no European records a single case of cure. 2nd. That no native drug has been proved to be curative. This statement need not, however, stay our investigations, even as regards treatment. Many diseases are in the same category—as, for instance, phthisis. Consumptive patients are not left uncared for; the victims of syphilis, of malaria, the gouty, the scrofulous, in fact the sufferers from any so-called constitutional taint, inherited or acquired, can all be bettered by care and treatment, although the taint can never be removed. So with leprosy: the condition can be relieved as decidedly as any of those mentioned, and although cure cannot be secured, symptoms can be relieved and signs assuredly ameliorated. Dr. Horder, than whom there is no better authority, remarked to me, that in Pakhoi, "I treat my leper patients as though they were consumptives." Dr. Horder insists that a leper shall remain in his hospital for six weeks at least every year. During that period the leper is mostly confined to bed, he is provided with good food, iron and cod-liver oil are administered, and it may be some of the "specifics"

are employed. Under treatment the leper gains in weight; his ulcers heal; cough and fever, if there are such, disappear; and he returns to his native place much improved. Dr. Horder claims that in this way he can keep lepers alive for an indefinite time, that he can alleviate almost all symptoms, and that no disease is more amenable to simple hygienic laws than is leprosy. With Dr. Horder's theory and practise I entirely agree, and his statement offers a rational line of treatment to follow.

PART I.

THE CONDITIONS UNDER WHICH LEPROSY AT PRESENT PREVAILS IN CHINA, COCHIN-CHINA, BATAVIA, AND THE MALAY PENINSULA.

A.—CHINA.

THE PROVINCES OF THE MIDDLE KINGDOM.

The eighteen provinces of China are divided as follows :—

Northern Provinces—

	Capital.
*Chihli	Peking.
*Shantung	Tsinanfu.
*Shansi	Taiyuenfu.
*Honan	Kaifungfu.

Eastern Provinces—

*Kiangsu	Kiangningfu.
Nganhwai	Ngankingfu.
*Kiangsi	Nanchangfu.
*Chehkiang	Hangchaufu.
*Fukien	Fuchaufu.

Central Provinces—

*Hupeh	Wuchangfu.
*Hunan	Changshafu.

Southern Provinces—

*Kwantung	Canton.
*Kwangsi	Kweilinfu.
Yunnan	Yunnanfu.
Kweichau	Kweiyangfu.

Western Provinces—

Shensi	Singanfu.
Kansuh	Lanchaufu.
*Szechuen	Chingtufu.

To each of these provinces circulars of inquiries were sent, and those from which replies were received are marked with an asterisk. When it is remembered that Chinese doctors generally belong to the ignorant classes ; that they

* Replies received.

have no qualification save the possession of a few nostrums, as often as not mere magic potions; that even if questioned they would not deign to reply; and, further, that European doctors are few and far between, and posts irregular and uncertain—it is not to be wondered at that the information is incomplete, and largely derived from the neighbourhood of the treaty ports.

China Proper (the Middle Kingdom).

China proper lies practically within the parallels of 20 and 44 north latitude, and is bounded on the east by the Pacific Ocean, and extends westwards from about east longitude 124 to 100.

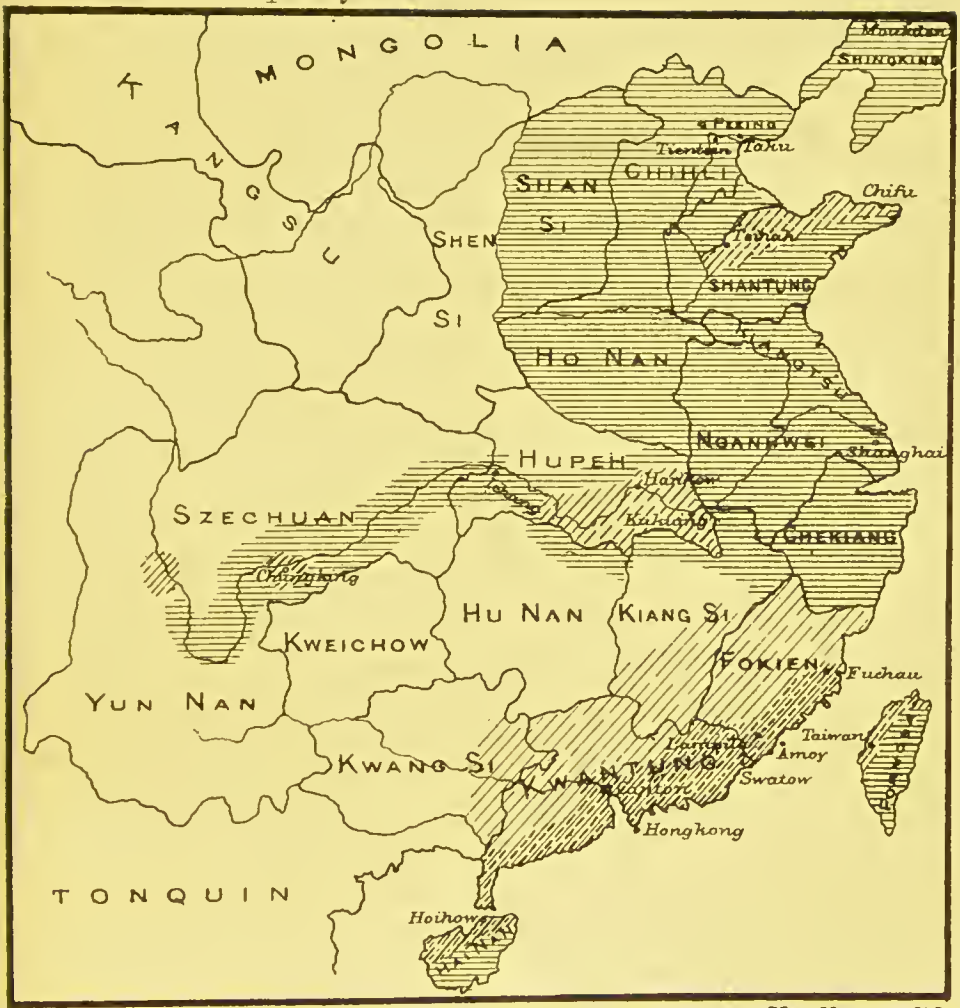
Its orographical and hydrographical features are very striking, and are illustrated by the accompanying map, drawn by Mr. S. B. J. Skertchly, F.G.S., late of H.M. Geological Survey, from the best published sources, and from personal observations by himself and Mr. T. W. Kingsmill, C.E.

Its eastern area is the western limit of the vast tableland of high Asia, nowhere sinking below one mile in height, and sending long spurs eastwards, which, though somewhat broken in continuity towards the east, divide the country into three great drainage basins—the Hwang-ho in the north, the Yangtse in the centre, and the Si-kiang in the south.

Eastwards of the highlands, and extending to the coast, is a vast and generally fertile plain — the Great Plain of China,—which expands in the valley of the Yangtse in the central province of Hupeh, forming a secondary plain. Hills reach almost or quite to the coast in the provinces from Fokien southwards.

China is practically shut off from all rain-bearing winds, except the south-west monsoon, which blows from about April till October. This wind flowing in from the hot tropical seas, brings its burden of moisture from the south, and sheds it upon the hill and mountain country of the southern and central provinces. The bulk of that which can get across the Yangtse valley is thrown down against the mountains which separate the basin of that river from

Mr J. Canthie's "Leprosy".



S.B.J. Skertchly, F.G.S.
Hongkong 1894

West, Newman lith.

Rough Sketch Map.

Leprosy *known to be very prevalent.*

" Present *but less prevalent.*

" *probably* Absent.

No information.

that of the Hwang-ho. Hence the winds arrive as fairly dry breezes in North China.

North and west of China lies the vast plateau of Asia, with its colossal ranges stretching east and west, so as to intercept the moisture which might otherwise reach north China.

The result of this configuration of Asia is that China may be divided into two regions: (1) that of the north, or the Hwang-ho region, which is suffering from the secular desiccation of Central Asia, and steadily lapsing into desert; and (2) the southern region, comprising the basins of the Yangtse and Si-kiang, which enjoys the full benefit of the rain-bearing south-west monsoon.

This drying up of the north is inevitable; it is the direct result of the geological growth of the continent, which Skertchly and Kingsmill have shown to be of very recent date. Already the Hwang-ho has lost the drainage of Kashgaria; and the Tarim, once a tributary of the Hwang-ho, is now a continental stream, shut off completely from the sea. The traveller in North China, going west, is vividly impressed with this desiccation. He sees it in dying streams, in dry watercourses, in dwindling or deserted towns, and already the desert seems to be knocking at the western gates of Peking. Nor is this gradual decay of fertile land entirely owing to secular, and therefore irremediable, causes; much of it is due to the wilful destruction of trees by the Chinese. China is practically devoid of forests; the Chinaman cuts down every tree as though it were a curse, and his dislike of pastoral life is stripping the land of its grass. Fuel, in spite of the immense coal-fields, is scarce and dear, and the peasantry drag up by the roots every patch of grass they can lay hold of. This is hastening the time when North China will become uninhabitable. This it is which is driving the people coastwards; this it is which is sending them abroad over all the tropical lands, and much of the temperate. Their own country can no longer support them, and, with their utter lack of decency and cleanliness, they carry into their new homes not only the thrift of the trader but the filth of the savage. One of the evils of this steady migration is the spread of leprosy. Wherever the Chinese

coolie has settled leprosy will be found, and no impartial student of the question can fail to see that in the Pacific and the East Indian islands leprosy has dogged the footsteps of the Chinese coolie. There may be other causes; this is certainly one. If a trained man of science, say a geologist, were to make the circuit of the Pacific Islands, this would doubtless be made clear. The dread disease is independent of soil and elevation — independent of temperature and vegetation; but in the Far East it is dependent upon the Chinaman.

The distribution of leprosy in China itself will be dealt with further on; but in order to form an idea as to whether physical conditions influence the disease, it will be advisable to call attention to another marked distinction between the Hwang-ho area and that to the south. The map shows that from the borders of Shen-si this great river does not receive a single tributary of note, and moreover, that it does not drain the lands of Shantung.

Again, over the greater part of its course it flows over porous *loess*, or equally porous sands, which actually absorb a great part of the water. Hence, whereas the Yangtse is a noble river, entering the seas by a majestic *embouchure* sixty miles in width, the Hwang-ho at its mouth cannot compare with the Thames, and could not be entered by the smallest collier brig.

The climate in this porous northern district is in marked contrast to that of the south. Its summers are hot and dry, so that one's skin cracks and peels, unless it is oiled. Further south the summer is hot and damp, like an English greenhouse. The northern winters are bitterly cold; in the south they are only refreshingly cool.

We have, then, in China every variety of climate, elevation, and soil. Hill country and plain alike support the thronging millions of China; from mountain fastnesses, over a mile above sea level, to marshy river deltas, half awash with brackish tidal waters; from summer air saturated with vapour to summer air dry as a furnace blast. Coast ranges and inland mountains, plains which reach the sea, and those lying deep within the land—all are here. Yet when we come to the distribution of leprosy, all we can say is, that it

is commoner in the south than the north; that it is rare in the maritime portions of the north, but that it is far from absent from the interior of Shantung.

Different as the two regions are in other respects, they agree in receiving their chief rains during the summer, that is the S.W. monsoon. But whereas the southern region is fairly open to the influence of the warm monsoon, the northern region is cut off by Korea and Japan from the effects of the northern part of the monsoon. How effectually these mountain lands drain out the moisture is shown by the rainfall of Yuensan in East Korea being 49·37 inches, and that of Chefu only 26·84 inches per year. Further south the rainfall is much more excessive, reaching 136 inches at Tamsui in North Formosa, 107 at South Cape, Formosa, 91 at Hong Kong, and 41 as far inland as Ichang in Hupeh, on the Yangtse.

We have, therefore, in China an enormous area, differing in every possible way in climate, elevation, and soil, but all dependent for its rain on the same source. It thus affords an admirable field for investigating the supposed effects of the conditions of existence upon leprosy.

The Province of Chihli.

(Leprosy unknown.)

Chihli, the most northern of the maritime provinces (often called Pechihli, that is North of Chihli, on the maps), contains Peking, the capital of the empire.

The Great Plain reaches into this province, forming the whole of the eastern and north-eastern parts thereof, as far west as Peking. Here the mountains close in, approaching within a few miles of the city to the west, and thence circling round to the north and east.

The plain is composed of a sandy alluvium on the east, formed of re-arranged loess, which peculiar formation takes the ground in greater purity, but still showing evidence of degradation, on the west.

Towards Mongolia the massif of the mountains is archæan gneiss and granite, flanked with schists, which are in turn overlaid by rocks of the carboniferous system, containing valuable coal.

At Taku, on the Gulf of Chihli, the Pei-ho falls into the sea. This river receives numerous other streams, of which the Hwei, often called the Grand Canal, is the most considerable. It joins the Pei-ho at the large city of Tientsin.

Agriculture, the manufacture of samshu, a native wine made from sorghum, a little coal mining, and a large manufacture of salt at Taku, with a vast carrying trade, are the chief industries.

The reply concerning leprosy is very full and complete, and is contained on a post-card. It runs as follows:

"I should be pleased to answer your questions respecting leprosy in the district of Peh-chihli, but so far as I can gather, it is not known in this part of China. I have not met with a case here.—A. K. MARSTON, L.K.Q.C.P.I. & L.M."

I travelled through Chihli in May, 1894, from Taku, at the mouth of the Pei-ho, to Tientsin, Peking, and the Great Wall by road, and returned by the river to Taku, and never saw a case of leprosy throughout the journey, a distance of 400 miles. Along the road many beggars besought alms, but no leper was seen. Information obtained at Taku, supplied by Dr. Cheong, a Chinese graduate trained in European medicine at the Tientsin Medical College, confirmed the absence of leprosy in that district. Tientsin, famed as the centre of medical science in North China, endowed with a hospital under the immediate patronage of Li Hung Chang, distinguished above all other towns in China by the possession of a medical college for Chinese, contains no lepers. Were there any within hundreds of miles they would be attracted thither. So, without further comment, it may be safely stated that leprosy is not endemic in Chihli.

A stray case or two have appeared. In 1887 one turned up at the medical clinic, hailing from Chefu. The leper had travelled from that city across the Gulf of Chihli, to seek relief in Tientsin. Another in 1888 came from the same district—the great plain of Shantung.

Such cases, however, do not make Chihli an infected

province. Indeed, they point to the fact that the natives are not prone to the contagion. Chihli may be said to be as free from leprosy as the county of Middlesex.

In Peking, Dr. Dudgeon confirmed the statement as to the absence of leprosy in that city. Within the city walls are communities of all the northern tribes of the empire, Manchus, Tartars, other Mongolian tribes, and Chinese; still leprosy is not known.

The absence of leprosy from Chihli is not more wonderful than the freedom of the provinces north of Fokien, viz. Chekiang and Kiangsu; and were it not for Shantung the entire northern coast would be free from leprosy.

Away to the north of Chihli lie Manchuria and Siberia, of whose leprosy the public have of late years heard so much. But Siberia is a long way off. Elevated plateaus, some of the highest in the world, "antres vast," and snow-capped mountain ranges intervene between China and Siberia; the country is but sparsely populated, and this wide intermediate zone, nowhere less than ten degrees of latitude in width, or the distance between Madrid and London, forms the water-parting of Asia, Siberian rivers flowing north into the Arctic Ocean, China's rivers east to the Pacific. Again, the climate is totally different; Siberia is in the region of variable, China of monsoon, winds. No two parts of the same continent could be more distinct orographically, hydrographically, climatologically, or ethnologically. The great deserts of Gobi and Shamo completely cut off the Mongoloid tribes of Siberia from their cousins in China; and to crown all these, the deserts are rainless, so that the very vegetation fails to pass from the one region to the other.

I cannot pretend to any knowledge of Siberia, save that I visited Vladivostock in June, 1894, and made inquiries concerning leprosy; but no leper was known there. The native population which the Russians found there has disappeared. The present inhabitants of Vladivostock are Government officials, soldiers and sailors, and a few commercial men from the Baltic provinces of Russia, or the shores of the Black Sea. Amongst these specially selected men leprosy is not likely to be met with. Even the coachmen

and others who style themselves Siberians are free from leprosy, and no case is known in the district. Chinese are engaged as labourers on the railway, and they come from the contaminated provinces; but I heard of no lepers among them.

In Saghalien, again, there are no lepers; doubtless for the same reason, namely, the absence of natives, and the presence only of selected Russians from Europe.

Saghalien is the great political prison, but no leper is likely to be sent the long journey from Europe thither.

Still more interesting is the fact that the Siberian town of Alexandrovitch, near the mouth of the Amur River, is free from leprosy. Here is a Russian station of some importance,—so important, in fact, that were any lepers living along the lengthy course of the Amur, they would have drifted towards the capital for treatment.

Eastern Siberia, then, may be held to be free from leprosy, if the meagre details I have been able to gather from a visit to the region, and the extensive inquiries I have made, are to be relied upon.

Reports on the prevalence of leprosy in the province of Chihli.

Peking.—1. Dr. Dudgeon, a leading practitioner in the city, and of long experience, informed me personally in May, 1894, that leprosy did not exist in Peking, nor in the neighbourhood.

2. Dr. Marston, of the China Inland Mission, writing from Peking, May 30th, 1894, reports :—"I should be pleased to answer your questions respecting leprosy in the district of Pechihli, but, so far as I can gather, it is not known in this part of China. I have not met with a case here."

Tientsin.—This is a large city of over 1,000,000 inhabitants in the province of Chihli, and some eighty miles from Peking. It is the seaport of the capital, and the centre for an enormous traffic to the interior.

1. Dr. J. Frazer, L.R.C.P., &c., writing from Tientsin, province of Chihli, China, states, "No leprosy exists in this province."

2. Chung, a graduate of the Tientsin College of Medicine, and now house surgeon to the Alice Memorial Hospital in Hong Kong, informed me that during his five years' residence in Tientsin only one case of leprosy was seen in the clinic of the native hospital. The case was from the infected province of Shantung, not from Chihli.

3. Personal inquiries made by myself during my visit there in May, 1894, failed to elicit any other reply than that "leprosy is unknown in the neighbourhood."

Remarks.—How are the above statements to be reconciled with those quoted in the excellent prize essay written for the National Leprosy Fund by Dr. George Newman? He quotes at pages 81 and 82 a long extract from Doolittle's 'Social Life of the Chinese,' pp. 524—527, on two large leper asylums at *Tientsin*, which is to the following effect:

"There are two large asylums, or places of refuge and of residence, at *Tientsin*, for the wretches who are taken with leprosy, located on the outside of the city near the east and west gates. Two or three hundred lepers live at each of these asylums." A long report of this asylum is given. I can offer no explanation of this conflict of opinion. My information was obtained from medical men, European and Chinese, dwelling on the spot, and I went personally to Tientsin to gain information, but all attended by the same negative result I had received by the written records.

I may say at once this is a mistake; there are no leper hospitals at Tientsin. My reasons for stating this so positively are as follows.

1st. I personally visited Tientsin in 1894, and made extensive inquiries as to the prevalence of lepers and leper hospitals. I found neither the one nor the other.

2nd. The positive written statement of resident medical men, English and Chinese, well acquainted with Tientsin, that no leper hospital exists there.

3rd. As I was not acquainted with Doolittle's statement, not having seen Dr. Newman's report until after my arrival in this country, I wrote Dr. Irwin of Tientsin to make further inquiries as to the presence of leper hospitals at Tientsin, and asked him to telegraph his reply so as to be in time for this publication. He answered to my query "Are there leper

hospitals at Tientsin?" "No." From all these cogent proofs I conclude that the statement that leper hospitals exist at Tientsin is a misrepresentation or a misstatement, and that Chihli is free of leprosy.

Taku.—The fortified entrance to the Peiho River at Taku is surrounded by a populous city. Here Dr. Cheong, a graduate of the College of Medicine at Tientsin, informed me that "no leprosy is met with in the neighbourhood."

The Province of Manchuria.

(Leprosy unknown.)

Manchuria of the maps, and Manchuria as understood in China, express two different ideas. The former is the Manchurian province of Tsitsihar, lying between the main Amur River and its important tributary the Sungari; it, therefore, has no seaboard. But the Chinese include two other provinces as belonging to Manchuria,—Shinking or Liao-tong, stretching from the Gulfs of Liao-tong and Korea northwards to the river Liao-ho; and Kirin, which lies between Shinking and Tsitsihar. It is with the Shinking district—in which, in fact, the capital of Manchuria, Moukden, is situated—that my inquiries deal, as no information is forthcoming from the interior.

Manchuria forms the south-eastern part of the great table-land of Asia, but, as we are only concerned with Shinking, that province only will be described.

It is a mountain region, broken by the valleys of two rivers, the Yaloo and the Liao, both of which have broad alluvial flats bordering the water, and many miles in width.

The rocks are chiefly igneous and volcanic, with tracts of archæan and carboniferous rocks.

The plain of the Liao, on which Moukden is situated, is over fifty miles wide, undulating, and rising towards the interior, so that Moukden, 150 miles in a direct line from the coast, is only 300 feet above sea level.

The hills are well wooded, and the climate extreme and dry, the highlands of Korea cutting off the rain-bearing

winds to such an extent that only about 27 inches fall in the year, as compared with 60 inches at Fusan in South Korea. Other details are given in Dr. Christie's report.

I, the writer, very fortunately met Dr. Christie at Chefu in May, 1894, and learning that he came from Manchuria, availed myself of an interview with him on the subject of leprosy.

He told me that endemic leprosy seems to be unknown in Manchuria; the few cases seen were Chinese from the south (Canton). The occurrence of a few cases during an experience of many years does not, however, proclaim the country infected, any more than the case of the London butcher renders England a leper centre; nay, not so much, for the patients seen in Moukden were not even Manchus, but were as much foreigners to Manchuria as Norwegians are to England.

Manchuria has no infected seaboard, nor can it get infected from the north, considering that Eastern Siberia is free from the disease, as shown under the heading of Chihli. Northern Manchuria drains in the opposite direction to the flow of the rivers in Shinking, and the water-parting is a range of high mountains, so that there seems no liability of infection from this source even if leprosy did occur there, of which there is no proof.

Manchuria must, therefore, be declared free from leprosy, and the Manchus, the reigning dynasty of China, as a tribe non-leprous.

Report by Dr. Dugald Christie, L.R.C.S., L.R.C.P.Ed., Moukden, Manchuria.

(Leprosy unknown.)

Leprosy seems to be unknown in Manchuria; I have met with a few cases in Moukden, but they came from other parts of China. The larger part of the country is comparatively flat. Moukden, the capital of the province, though about 150 miles from the sea, is not more than 300 feet above sea level. The wide undulating plains are fertile, well watered, and for the most part densely populated. The soil is chiefly loam. In the east there are extensive mountain

ranges, some precipitous with deep narrow gorges, others rounded, wooded to the summits, and intersected by broad well-cultivated valleys. There is but little large vegetation in Southern Manchuria except on the hills, but wide stretches of forest are met with in the far north. The climate of Manchuria is distinctly continental, and not influenced by oceanic currents. There is no shelter from the cold winds which in winter sweep across the Siberian and Mongolian plains, and the temperature falls to 28° F. below zero in Moukden. The thermometer often stands at 97° F. in summer, but the atmosphere generally is clear, dry, and bracing, so that the senses do not indicate such extremes.

The total rainfall for 1893 was twenty-seven inches, of which, on two occasions, over three inches fell in twenty-four hours. There is little or no moist, damp weather.

Until the floods of 1888, when large stretches of country were under water, malaria was very rarely met with in Manchuria, but since then it has become more common. From 1882 until 1888 only twenty-eight cases were treated at the Moukden Medical Mission Dispensary. During 1893 over 400 came under observation.

The Province of Shantung.

(Leprosy is prevalent; occurs mostly inland.)

The northern maritime province of Shantung—the eastern hills—is washed by the waters of both the Yellow Sea and the Gulf of Pechihli, and through it now passes the lower course of the Hwang-ho. The capital, Tsinanfu, stands near the Hwang-ho, and from this district eastwards and southwards run, with many spurs and outliers, the sacred range of Tai-shan. These mountains, as may be seen by the map, rise above the great plain of the loess and other recent marine and fresh-water beds. They consist of archæan rocks to the east, overlaid westward by rocks of carboniferous age, of which the mountain limestone is a most important member, forming fine mountain ranges. The coal-fields occupy the depressions in the mountain limestone. For details of the geography and geology, with an account of the present and past meteorology, the reader may be referred to a paper by

Messrs. Skertchly and Kingsmill in the 'Journal of the Geological Society,' 1894.

The drainage is carried out by numerous small rivers rising in the mountains, and the Hwang-ho, dwindled by absorption to a third-rate river, enters the Gulf of Chihli. To this extraordinary river, aptly called "China's sorrow," Shantung owes the desolating floods which periodically waste so much of the otherwise fertile loess land.

The summers are hot and very dry, the winters are cold and bright, and the whole province shows unmistakable evidence of steady deterioration from desiccation. The plains grow vast crops of corn and millet, and every tree has been destroyed, save the ornamental willows and other trees around the towns and villages. The population is large, but almost confined to the plains. Most of the inhabitants are agricultural labourers, but there is a small population of miners who feebly scratch out a little of the vast stores of coal with which the country abounds.

Report by Dr. J. R. Watson, M.B., M.R.C.S., Chefu.

(Leprosy prevalent.)

Dr. Watson, of the Baptist Mission, passed through Hong Kong in April, 1894, on his way home after a sojourn of ten years in the province. The field of his labours is the district around Wei-hsien, far inland on the great plain at the foot of the hills. Some of this district is water-logged, and travellers hurry past it, for it has an evil reputation for malaria.

Every village of any size—and they are very numerous—has its one or two lepers, who are regarded as outcasts by the natives, and compelled to dwell apart.

Dr. Watson recorded a case of a boy who acquired leprosy through sleeping with a younger brother who was a leper. Here the question of heredity *versus* contagion crops up. As a brother he may have inherited it, as a bedfellow he may have acquired it; and thus it ever is and will be with persons living under the same roof. That leprosy is communicable by dwelling with lepers is an established fact, and this must obscure the evidence of heredity.

The leprosy is ascribed by the natives to marshy ground and damp houses; and when we remember how often this district is whelmed in the floods of the eeeentric Yellow River, some eolour of reason is given to the local belief.

It is interesting to note that after an interval of pretty nearly 1000 miles of coast-line, from Fuehow to Chefu, leprosy again appears, and again the natives assign marshy ground and damp houses as the cause. In the provinces of Kwantung and Fokien we found the same causes assigned, and all the Chinese outside these provinces ascribe the prevalenee of the disease to damp ground.

Dr. Watson further stated that leprosy seemed more prevalent inland than on the eoast. Here, again, is a seeming refutation of the world-wide belief that the disease is more eommon on the seaboard, and of the corollary usually added, "owing to the large consumption of fish by the dwellers by the sea." The inland dwellers, however, eonsume salt or rotten fish even more freely than do those living by the seashore.

Notes from information personally eonveyed by E. W. Von Tunzelmann, M.B.Lond.

(Leprosy rare.)

The writer visited Chefu in May, 1894, and made personal inquiries as to the prevalence of leprosy. Dr. Von Tunzelmann stated that leprosy was very rarely met with at that port, and referred me to other medical men who had a few cases under treatment. Leprosy, however, proved to be a very rare disease, and the eases came from inland, from the great loess and marine-sand plain above deseribed.

It was fortunate that Dr. Von Tunzelmann's and Dr. Watson's statements eame to hand, otherwise in this report the grievous error of declaring the coast of China north of the Formosa Channel as free from leprosy would have been committed. Here, however, the bold promontory of Shantung arrests attention, and we find the purity of the coast somewhat soiled.

North of this again the leper disappears, so that Shantung

stands isolated among the coast provinces of Northern China as being a leper-bearing land.

How did the disease reach this province? The great, but here sadly diminished Hwang-ho, or Yellow River, flows through Shantung, to fall into the Gulf of Pechihli. Is it along the valley of the river that the disease has travelled? I can give no answer; I have no information. The Europeans, if there are any dwelling along its banks, have sent no replies to my queries. It is an interesting point to follow up. The mightier Yangtse rather neglected the water-carriage of the disease, considering its absence from Shanghai, and so we have no proof that leprosy is brought down stream. Yet how else, except by water, is leprosy to reach the coast of Shantung? A possible answer may be found in the constant stream of caravans from far away Thibet, that is always flowing through Shantung.

Perhaps the consideration of leprosy in Korea and Japan, the coasts immediately opposite Shantung, may throw some light on the subject.

The Province of Kiangsu.

(Leprosy not indigenous.)

The maritime province of Kiangsu is intersected by the great river Yangtse, whose waters, carrying their burden of yellow mud into the sea, give origin to the name Yellow Sea. The land is for the most part level, consisting largely of delta and other recent deposits of the Yangtse, and the bay that the river has filled with its alluvium. To the west, hills and mountains rise from the plain like islands from the sea, and islands they once were. Large lakes and irreclaimable marshes abound, but the climate is considered healthy, and the land yields large crops of grain, cotton, and tea. Nanking, Suchau, and Shanghai are the chief cities.

Shanghai is important not only as being the largest of the treaty ports, and the natural outlet of the vast wealth that pours down the Yangtse from far beyond the limits of even this great empire, but also from its proximity to the great and ancient cities of Suchau and Nanking, cities whose histories date back thousands of years.

Notwithstanding the immense and continuous influx of visitors from all parts of China, and indeed all parts of the world, Shanghai is not inflicted with a leper community; indeed, Mr. Skertchly two years ago visited all the hospitals, native and foreign, and inquired of the medical men in the vain hope of finding a solitary leper for the edification of a medical visitor.

Nor is it likely that leprosy is indigenous in any district within many miles, many hundred miles, along the Yangtse waterway. Lepers travel enormous distances to see foreign doctors. I had a patient in Hong Kong, a leper from the shores of Lake Tien-chi, in Yunnan, a distance of 900 miles as the crow flies. He came to Hong Kong because a man passed through his village on his way inland whom I had operated upon for a huge lymph scrotum. The leper, failing in obtaining a cure from his native doctor, found his way down the Canton River, and after months of travel reached Hong Kong. Therefore Shanghai, with its wealth of medical men, could attract lepers from yet more distant regions, did leprosy abound in the area drained by the Yangtse.

The conclusion may be fairly drawn, therefore, that in this vast area, in the words of Dr. Jamieson, "leprosy is the rarest of rarities."

Letter from (the late) Dr. R. A. Jamieson, Shanghai, May 24th, 1894.

"I should be very glad to answer your questions respecting leprosy if there were any specimens of the disease to be found here. It is the very rarest of rarities in Shanghai, so rare that I should be afraid to say how few cases I have seen in the twenty-six years during which I have been without interruption connected with large hospitals for natives."

Nothing could be more to the point than Dr. Jamieson's statement. Shanghai is so great a centre of commerce and traffic, and so well supplied with European doctors of wide-spread reputation, that, were any lepers in the province of Kiang-su, they would be sure to congregate there, either

for alms or for treatment by the foreign doctors. Kiang-su may be pronounced free of the disease.

Letter from Dr. Burge, Shanghai, May 22nd, 1894.

"I am sorry I have very little experience as regards leprosy. I will, however, see if I can collect a little information on the matter."

Dr. Burge's statement bears out Dr. Jamieson's. It is evident that leprosy need not have been seen in Shanghai by either of the observers, so that it may be conclusively stated that leprosy is not indigenous to the province of Kiangsu.

The Province of Hupeh.

(Leprosy occurs in isolated parts of the district.)

The central province of Hupeh takes its name ("north of the lakes") from the maze of lakes which lie within the central plain, as may be seen on the map. Its area is about 50,000 square miles, the southern half of which is alluvial plain, the northern mountainous, for here the Kiu Long mountains terminate.

The Yangtse flows through it from west to east, and into this mighty stream falls the Han River, flowing from the north. At the confluence stand the united cities of Hanyang and Hankow, and across the Yangtse, here a mile wide though it is 600 miles from the sea, is the city of Wuchang, the capital of the province. To Hankow come the largest ocean steamers, for this is the very centre of the tea district.

Report by S. R. Hodge, M.R.C.S., &c., Hankow, Province of Hupeh, China.

(Leprosy no great scourge; no segregation.)

Hankow is situated on a flat alluvial plain on the left bank of the Yangtse, some 600 miles from the sea. The

subsoil is constantly damp, and the whole country highly malarious. The summers are short but intensely hot, and during the spring and autumn sudden variations of temperature are the rule; the country is thickly populated, and rice-fields are everywhere.

Distribution.—There are no mountains within 100 miles of Hankow.

Heredity.—The natives are very decided in the opinion that leprosy is hereditary.

Contagion is only believed in to a moderate extent; the ordinary intercourse of daily life is not feared, but they will not sleep with a leper. If a girl is betrothed to a man, and subsequently it is found he is leprous, the match is broken off. Still the direct and positive contagiousness of leprosy is not quite admitted. A native confessed (to Dr. Hodge) that he knew a man leprous for five years, but that his wife never took it.

Food.—Some associate leprosy with eating bad fish; others blame the eating of reptiles.

Segregation is not observed in Hankow.

Vaccination.—No information. The Chinese practise inoculation for smallpox here.

Treatment.—Amelioration, but no cure, can be obtained by some one or all of the present-day methods of treatment.

The Chinese have several reputed "curing drugs."

Report by A. Morley, L.R.C.S.&P., Teh Njan, near Hankow, September, 1894.

(Leprosy rare.)

I have carefully gone through my note-book, and I can find only ten cases of which I was certain of my diagnosis.

Heredity.—The Chinese seem to find a special connection between ascites and leprosy. They deny that leprosy is hereditary, but consider that ascites in their ancestors predisposes to leprosy. Two lepers stated that their fathers died of the disease; a third stated that father and uncle were both lepers, and a fourth that his uncle died of leprosy.

Contagion is not believed in.

Food.—The Chinese lepers here do not ascribe leprosy to fish.

Segregation not practised.

Treatment.—The cases I have seen came to me apparently for diagnosis; consequently I have never had an opportunity of treating cases.

Extract from letter sent by Herbert Brady, Esq., H.B.M. Acting Consul, Ichang, June 12th, 1894.

(Leprosy unknown.)

"From inquiries which I have made it appears that the disease is not endemic here. Dr. Aldridge, of the I. M. Customs, who has had charge of the Church of Scotland Mission Dispensary—the only (native) hospital in the city—for some years past, informs me that he has not met with a single case, and I notice that the disease is not mentioned in any of the 'Customs Medical Reports,' which go back to the year 1877."

The Province of Szechuen.

(Leprosy rare. Leprosy does not follow the Yangtse course.)

The western province of Szechuen is the largest of the eighteen provinces of China, having an area of no less than 107,000 square miles. It is essentially a highland province, none of it being below 1500 feet and much of it over 5000 feet above sea level, as a glance at the map will show. Its name—the Four Rivers—indicates that it is a province of valley plains as well as of hills and mountains, and its plateaus and many of the hill-sides are under cultivation. Unlike most of China it is well wooded, large forests of pines clothing the mountains, especially in the east. The mountains at several points overtop by some thousands of feet the snow-line.

The rocks are mostly sandstone and limestone, and coal seams of carboniferous age, overlying archæan gneiss and schists, which with granite crop out on the flanks and cores of the higher ranges.

The Yangtse flows through it, its huge volume receiving large additions from several considerable rivers and a multitude of smaller streams.

Rice, wheat, barley, millet, sugar-cane, tobacco, and of late potatoes, are largely cultivated. It is, moreover, the district which yields the chief supply of Chinese medicines.

The Szechuen inhabitants are less jealous of foreigners than usual in China, and generally more civilised, as shown by their roads, which though not good in a European sense, are much better kept than elsewhere in China. Yet even here famine lays its gaunt hand upon the land, as it always will till China perceives the value of facilitating the means of communication between her provinces.

On the hills and in the mountain fastnesses the aboriginal race, usually called by the collective name of *Man-tze*, still exists in considerable though steadily diminishing numbers. They are Chinese in feature, but with more regular teeth, and Gill makes the almost incredible statement that they are dirtier than the Chinese. They speak dialects of the Thibetan language.

My information from this far-off province consists of three communications, one from Dr. Davenport, of the London Mission. During a three and a half years' sojourn he has seen at most but four cases of leprosy, and this too at a hospital where from 7000 to 8000 patients have been treated during that time. Leprosy cannot, therefore, be considered a severe scourge in his district.

From the headquarters of the French mission, however, in Hong Kong, I learn that their missionaries state that leprosy is frequently met with in Szechuen, so much so that they have written to headquarters for money to build a refuge for the lepers.

On the other hand, the city of Ichang, near the border of Szechuen, but in the province of Hupeh, is free from leprosy, according to the statement of Mr. Brady, the British Consul. Ichang, like Chung-king, whence Dr. Davenport writes, is on the Yangtse-kiang. Ichang, therefore, intervenes between Chung-king, in the upper reaches of the Yangtse, and Hankow, 844 miles lower down. At Hankow and its neighbourhood leprosy is known, and it

is absent from Shanghai, which may be considered as practically at the mouth of the Yangtse, 600 miles from Hankow. In a distance of 1500 miles from the mouth of the river upwards we thus have centres of leprosy at Hankow, 600 miles, and Chung-king, 1500 miles, with hundreds of miles between free from the disease. It may hence be reasonably inferred that leprosy does not follow the flow of the river.

Extract from letter sent by Dr. Cecil Davenport, Chung-King, Szechuen, June 27th, 1894.

(Leprosy very rare.)

"I am unable to give any information concerning leprosy, for I have seen only three or four cases among the 7000 or 8000 out-patients I have seen during my three and a half years here. I had one case in my hospital which did very well under creolin dressing (20 ♏—℥j) and the internal administration of tonics, iodide of potassium, &c. I am sorry I cannot tell you more facts, but glad that there appears to be so little of the disease in this district."

Extract from letter sent by Dr. C. H. Finch, Sui-fu, Szechuen, July 4th, 1894.

(Leprosy very rare.)

"During a three years' residence here I have seen very little leprosy in this district. I hope to be able to answer your questions in another twelve months."

Segregation is not observed.

Vaccination is in practice in other parts of the district, but not here, and leprosy is observed only in Min-Lin-Shien.

Treatment.—Several native drugs are used, but none are reliable. Modern European drugs have been used in this district only quite recently.

N.B.—It is significant of the presence of lepers in the district that my information was gathered from a French missionary from Szechuen, who had come to Hong Kong to get the necessary funds wherewith to build a leper hospital

Report by French missionaries, Min-Lin-Shien, Szechuen, November 27th, 1894.

(Lepers occasionally seen. No Lolos (aborigines) are lepers. Leprosy confined to the Chinese. Where vaccination practised, no leprosy.)

Physical features.—The district in question is in the southern part of the province of Szechuen, not far from the source of the river Kien-Chang, one of the affluents of the Yangtse, and not far from the borders of Thibet. The district is very mountainous, treeless, and devoid of marshes or swamps. Rain from end of March to the beginning of July. Heat is intense during summer, very cold during winter. Population is very sparse. Rice-fields occupy the plains.

Distribution.—The hills are occupied by the Lolos, the aboriginal inhabitants, who never intermingle with the Chinese, and who are not lepers. Leprosy is only met with amongst the Chinese.

Heredity.—The natives believe leprosy to be hereditary, but they take very few precautions in their marriage contracts.

Contagion is not considered as a ready means of propagating leprosy.

Food.—Fresh fish is not obtainable, and salt fish is used but very sparingly. The ordinary food is rice, vegetables, and pork. Generally lepers are to be found only in the parts of the district where food is bad or insufficient.

Province of Chekiang.

(No leprosy.)

The maritime province of Chekiang is the smallest of the eighteen into which China is divided, being only about 39,000 square miles, or about 7,000 square miles larger than Ireland.

Situated in the south of the Great Plain, its surface is level except in its southern portion, where the Nan-Ling

range terminates. It is very fertile, densely populated, and the city of Hangchau is among the richest in the land.

It is drained by numerous small rivers, and is one of the centres of the silk and cotton industries.

Immediately the northern frontier of the province of Fokien is crossed, leprosy seems to well-nigh if not entirely disappear. The town of Wenchow, situated on the coast, is but a few miles from the southern frontier, and Dr. Lowry, well known as a careful observer in Pakoi and Wenchow, makes the statement that no cases of leprosy have been seen by him, and that the Chinese deny all knowledge of its existence.

Dr. Molyneux declares Ningpo and its environments free from lepers, the only case he reports being from a distant inland town.

The fact of the cessation of the prevalence of leprosy is interesting, and further interest attaches to Dr. Molyneux's statement that, while the seaboard is free from lepers, the disease prevails inland. This is contrary to the almost universally prevalent belief that leprosy is most widely spread along the seaboard. We have seen the same fact in the case of Shantung further north, p. 40. It is so difficult to obtain any information, even from a few miles inland from the coast of China, that the statement that lepers find their way from inland towards the sea-coast, from an infected to a clean district, bears a significance one might dwell upon at length.

Letter from Dr. Lowry, Wenchow, Chekiang, July 15th, 1894.

(No leprosy.)

"I am sorry I cannot help you in your leprosy inquiry. During my three years' residence here no cases have crossed my path, and from inquiries among Chinese it does not exist in this district."

Dr. Lowry is so well known for his excellent researches on leprosy in Pakhoi, that this statement is of great value, as any leper in his district would be sure to have gone to Dr. Lowry for treatment.

Wonchow is a town on the seaboard, and only a short distance north of the borders of the Fokien province. It is interesting to note the abrupt limit of leprosy in this region.

Letter from Dr. Molyneux, Ningpo, Chekiang, October 16th, 1894.

(Leprosy not indigenous.)

"There has come under my notice no case of leprosy from Ningpo or its neighbourhood, and I hear of no cases from the priests or the itinerant medical missionaries. The only two cases I have seen came from Show-shing, many miles inland from here."

It is interesting to note that on the sea-shore no leprosy is known, the two cases reported by Dr. Molyneux coming from the far inland town of Show-shing, likely Shau-hing of the maps.

Province of Fokien.

(Leprosy a scourge.)

The maritime province of Fokien lies between Kwantung on the south and Chekiang on the north, and faces the Formosa Channel.

Fokien is essentially a highland province, the hills in most places reaching to the coast, and continue into the islands that flank it. This mountainous mass is broken through by two rivers and their tributaries,—the Min, on which the treaty port of Foochow stands; and the Keu Lung, at the mouth of which is the treaty port of Amoy.

The mountains, at least near the coast, where alone Mr. Skertchly has examined them, belong to the same series of granites and volcanic rocks of carboniferous age which extend southwards through Kwantung. Inland, in all probability, the usual archæan and carboniferous rocks will be found.

The country produces rice, barley, and wheat, but not in sufficient quantities for home consumption. Tea is largely grown inland.

The climate is like that of Kwantung.

I class the province of Fokien with Kwantung as the cradle of leprosy in China. Mr. Sadler's short statement that "leprosy is mostly found in Fokien and Canton provinces, and little in the north," is most comprehensive and telling. He therein announces a great truth, and one of which I was not aware until I commenced this inquiry.

In regard to vaccination he mentions that there is a fear that leprosy is spread by 'wrong' lymph, but he does not say if this is the belief of the natives or of Europeans. If the fear exists among the Chinese, it is the only record we have that vaccination has ever been thought of in connection with the subject; though one or two cases in the Fatshan report gave vaccination as a possible cause of the disease.

Dr. Burno writes in Spanish from Lampilao in the south of the province, about eight miles from the coast, and 2000 feet above sea level. He gives some interesting details.

The number of lepers he has seen is very few, only three in twenty-three years. However, the natives seem well posted in all the dangers of leprosy, which they would not be were they not aware of its encroaches. This is very different from the way the natives of Northern China regard it, for they dub the disease *Tai Ma,* or Large Itch, signifying that it is regarded with no dread, but only as a severe and lasting form of scabies.

The Chinese have evidently anticipated science when they think "that it is caused by a microscopic animal that flies unseen."

Dr. Wong I Ek, a graduate of the College of Medicine for Chinese, Hong Kong, confirms the statement that leprosy is very prevalent in Foochow.

Letter from B. L. Paton, B.A.Lond., M.B., C.M.Edin., Tsoan-chow-foo, Fokien, June 4th, 1894.

(Leprosy not prevalent.)

"I am sorry I have not the information necessary to answer your questions respecting leprosy in this district."

The remark that Dr. Paton has not the information means to say that there is but little material to gather

experience from. Where Tsoan-chow-foo is I cannot locate, but I infer it is an inland town some way up country from Amoy.

Extract from Mr. SADLER's report, Amoy, Fokien, July, 1894.

(Leprosy a scourge.)

Distribution.—Leprosy is mostly found in the Fokien and Canton provinces, and but little in the north. It seems to occur both amongst the dwellers in the plains and hills.

Heredity.—The natives say that three out of ten cases of leprosy are transmitted.

Contagion is considered a likely way of acquiring leprosy.

Food.—Improper food is believed to cause the disease.

Segregation is observed. There are separate abodes in some places.

Cause.—It is thought that the disease sometimes arises from evil sores and taking wrong medicines.

Vaccination.—There is a fear that by the use of wrong lymph the disease may increase. It can be spread by lymph taken from a leper.

Treatment.—Tai-fung-tsz is most used by the natives.

Translation from the Spanish of a report by Rev. Fr. G. BURNO, O.P., Lampilao, Amoy, May 27th, 1894.

(Leprosy uncommon. Vaccination not remarked upon.)

Physical features.—The district of Lampilao is situated at about 1000 feet above the sea level, and two hours' journey inland from Amoy, the seaport. The district consists of a narrow valley surrounded by mountains. Nine years ago the mountains were covered with pine trees, but they are now quite bare, the trees having died in consequence of a worm, the "moakatai" of the natives.

The soil is very rich, but frequently there are droughts, originating, it is believed, in the absence of trees. Population very dense, distributed mostly in villages.

Distribution.—There are no villages in the mountains. I have seen few lepers, in spite of their houses being full of water during the rainy season. In twenty-three years I have seen three lepers only.

Heredity.—I know two Christian families (Chinese) in another district in which leprosy has been transmitted from the grandfather to the children and grandchildren. In some it appears when young, in others when they are about forty years old.

Contagion.—The Chinese believe leprosy to be contagious, and have great fear of contracting it, as according to their theory it is caused by a microscopic animal that flies unseen.

Food.—I have never heard the Chinese say that fish or other food may be the cause of leprosy. They declare that after having drunk samshu (Chinese wine) it is dangerous to fall asleep in a draught, in case of developing leprosy.

Segregation.—There are no attempts made at isolation; the leper girls are engaged as servants, and allowed to do all household duties as if nothing was the matter.

Tuberculosis, syphilis, and malaria.—No observations recorded.

Province of Kwantung.

(The cradle of leprosy.)

From this province replies were received from Canton, Fatshan, Swatow, Pakhoi, Hainan, and our own observations in Hong Kong and Macau, which geographically belong to Kwantung.

Kwantung is one of the southern maritime provinces, and is about twice the size of England. It is for the most part hilly, becoming mountainous to the north on the borders of Hunan and Kiangsi, but is broken by the broad and fertile valley of the Pearl River, the common discharge of the Sikiang and other streams. This alluvial tract, with the delta, supports a vast population, both on the land and on the water. The coast and adjacent islands consist chiefly of granite and associated volcanic rocks of car-

boniferous age; further inland archæan rocks occur, which in turn are overlaid unconformably by the mountain limestone and other rocks of the carboniferous series.

Kwantung is intersected by the Tropic of Cancer, and its products are those of warm countries. Rice is largely cultivated in the low ground, and this province is the northern limit of the cocoa-nut palm. The people are, as is usual in China, mostly agricultural, the mineral wealth being entirely neglected. The carrying trade supports a large floating population, and traders are numerous.

The summer is hot, moist, and rainy; the winters, cool from November 1st until March 1st, are dry and bright.

First among my correspondents in Kwantung is Dr. Kerr, whose answers are entitled to all respect and consideration. He has spent well-nigh forty years in Canton, and has been a careful observer of many points of scientific interest, and is engaged in daily medical and surgical work in the hospital at Canton.

The province of Kwantung is so densely populated, and so large a centre of leprosy, that many opportunities exist for observation. Perhaps no more advantageous opportunity is offered, than the city and surroundings of Canton afford, to get at the connection between vaccination and leprosy. Vaccination was introduced into Canton by the East India Company about the year 1801, since when it has been extensively practised. The importation of lymph to a region so remote as Canton was a great and serious difficulty to the continuance of the practice.

Lymph was also brought across South America from Spain, and thence to the Philippines, a Spanish possession in the China Seas. The East India Company sent fresh lymph from Calcutta, and so a supply was kept up. In time, as the practice was carried further afield into China, human lymph was used time after time, recurrence to the original source being impossible. The lymph at length became attenuated, and the small vesicles raised by the native lymph were mere abortions, and the protective power of vaccination against smallpox almost *nil*.

In spite of this the Chinese—and they are astute observers—never assert that leprosy has increased with vaccination;

and not only so, they even declare leprosy to be less prevalent now than a hundred years ago.

Dr. Kerr has never heard a whisper to the effect that leprosy has spread with vaccination; and I can bear testimony to the same effect in Hong Kong. Dr. Kerr, however, words his answer with scientific caution when he says, "No data exist by which an answer to this question can be given."

The reply from the French mission in Canton is most comprehensive and valuable. The statement that the natives of Kwantung and Fokien believe those provinces to be the centres and hotbeds of leprosy, is fully borne out by all the reports. Lepers have a peculiar knack of always belonging to somewhere else than the place at which they are encountered. Many of the reports from outside Kwantung testify to the truth of this statement; and few of the hundreds of the itinerant lepers I have seen in Hong Kong ever admitted having seen another case of leprosy in the place of their nativity. I am convinced that the two provinces of China bordering on the China Sea, Kwantung, and Fokien, are the chief seats of leprosy in China. The Chinese outside these provinces ascribe this to the heat and damp. This is mere coincidence, but later on this fact will be fully dealt with.

The records of the French mission go back to the seventeenth century, before the introduction of vaccination into China, and the answer given to the question of any connection between vaccination and leprosy is, "I have never heard that vaccination increased leprosy."

Leprosy seems to be diminishing according to their report, for in two old leper hospitals, dating from the seventeenth century, which used to shelter seven to eight hundred lepers, only a few cases are now met with.

Swatow (Kwantung).—Swatow is a treaty port in the northern part of Kwantung, on the river Han, which must not be confounded with the greater river of that name which flows into the Yangtse at Hankow. It has only achieved importance since the British established it as a trading port for the city of Chow Chu some thirty miles up

the river. Previous to this only a few Chinese inhabited the place.

Dr. Cousland states that the Chinese affirm that leprosy has increased within the last thirty years or so; but there is no evidence to show that vaccination has had anything to do with it.

He makes the interesting statement that the first lepers brought the disease back with them from Annam and Siam, where they had been resident for some years. Whether this is the mere natural tendency to ascribe leprosy to a foreign source or not will be discussed afterwards.

Dr. Anna Scott also testifies to the prevalence of leprosy around Swatow. The all-important question concerning vaccination receives very careful attention from Miss Scott. All the members of the mission station with which this lady is connected have been forced to the conclusion that leprosy has increased among children, and they ascribe it to arm-to-arm vaccination, as practised by certain Chinese "doctors." Dr. Anna Scott also remarks upon the prevalence of phthisis among leper children.

Fatshan (Kwantung).—Fatshan is practically a suburb of Canton, and is situated on the same alluvial plain.

The apology with which Dr. MacDonald's report opens is surely not required. The careful clinical records he sends of 122 lepers is, perhaps, the most valuable contribution to the study of leprosy which ever emanated from the Far East. It will be found in another part of this Essay.

Dr. MacDonald is inclined to believe that an increase of leprosy has been due, or may be partially ascribed, to Chinese vaccination.

Pakhoi (Kwantung).—Pakhoi, the most southerly treaty port of China, is a great focus of leprosy. Dr. Horder personally related to me in Hong Kong his treatment of lepers. He has an admirable hospital, maintained at an infinitesimally small cost, and thither lepers come for treatment.

He is convinced of the possibility of relieving leprosy of its worst features. He insists on the lepers coming to the hospital at regular intervals, say for a month or two every year. Good food, rest, cod-liver oil, and the applica-

tion of some of the medicines recommended for external use invariably afford relief.

Dr. Horder is of opinion that a leper, if not too far advanced, can be kept alive; and not only so, but that the disease can be well-nigh arrested by submitting the leper to much the same treatment as a patient suffering from chronic phthisis requires.

In this I entirely agree with him. We see, as a rule, only neglected lepers, outcasts, beggars, or those of the coolie class, who are poorly fed at all times, and who, when they become lepers, practically starve. Is this to be wondered at? Leprosy is not a more frightful or deadly disease than is neglected syphilis. Neglected phthisis gallops its victim to its grave, and could the leper be relieved, even to a limited extent, he would be in no worse a plight than is the subject of phthisis, cancer, or neglected syphilis, except that he is avoided as a source of infection.

Hainan (Kwantung).—The island of Hainan lies close to the southern coast of the province of Kwantung, of which it is a separate department. It consists of a central mountain system rising from a plain. The Chinese inhabitants are chiefly descendants of emigrants from Fokien, but the true natives, who live in the hills, belong to a different branch of the Chinese group, and have little communication with the people of the plains.

The report of Mr. Parker shows how much knowledge upon such subjects as leprosy can be supplied by educated men endowed with keen powers of observation. I am deeply grateful for the information from this outlying island.

Mr. Parker's observations tend to show that the Chinese of Hainan believe leprosy to be hereditary, and that the disease can be acquired by connection or inoculation. Vaccination or inoculation for smallpox has never been suspected of conveying leprosy by the Chinese.

Evidently leprosy is very prevalent around Hoihow, from what I have learned from other sources.

Hong Kong.—See separate report written by author in 1890; and added as an appendix.

Extract from report by J. G. Kerr, M.D., LL.D., Canton, Kwantung, August, 1894.

(Leprosy a scourge.)

"*Physical features.*—South and south-west of Canton is a large, well-watered delta within tide-water mark. The soil is alluvial, rich, and well cultivated, yielding fine crops of rice, vegetables, and fruits. North and east of Canton is hilly, with well-cultivated valleys along the river courses.

Rainfall in the spring months is usually abundant, the atmosphere being charged with moisture. During summer months showers are frequent. The autumn and winter months are usually dry.

Meteorological Register.

Fatshan, near Canton.

1887.	Mean height of barometer.	Minimum temperature.	Maximum temperature.	Mean temperature at 4 p.m. in shade.	Do. Wet bulb.	Amount of rainfall.	Number of rainy days.
	in.					in.	
January . .	30·15	40	73	56·2	54·6	9	11
February . .	30·16	40	73	57·0	53·5	¾	8
March . .	30·08	52	79	64·0	62·4	6	12
April . .	29·98	55	86	73·8	69·6	6½	9
May . . .	29·48	69	90	79·0	77·3	7½	14
June . . .	29·85	70	91	84·5	81·5	4½	11
July . . .	29·75	72	92·6	85·0	80·8	6	19
August . .	29·85	72	93·3	85·6	80·8	6½	14
September .	29·01	75	93	84·5	81·3	8¾	11
October . .	30·08	62	86	77·2	72·0	2¼	1
November. .	30·49	55	81	69·8	65·0	¼	2
December . .	30·22	44	76	64·0	59·9	¼	3
Total .	...	...	...	...	...	58¼	115

Distribution.—Leprosy is met with chiefly amongst dwellers in the plains.

Heredity.—The Chinese believe leprosy to be hereditary. In the betrothal of children great care is taken to be sure that no taint of leprosy exists in the family of the other party.

Contagion.—The belief that leprosy is contagious is not definite. In many instances lepers are allowed to remain in the family, while in others they are not. They are allowed to pass to and fro in the streets without interference. In our out-patient rooms at hospital a patient will fan the seat just vacated by the leper, so as to blow away any emanations from the previous occupant. It is a general belief that the disease runs out in the third generation.

Food.—Fish, both fresh and salted, is in universal use as an article of food, which would not be the case if it were considered the cause of a disease so much dreaded as leprosy.

Sexual intercourse.—The Chinese believe sexual intercourse is one of the chief causes of propagating the disease.

Segregation.—There is a leper village a mile or two outside the east gate of Canton. The inmates go and come without any restriction, and are engaged in begging or some kind of light work during the day, and return to spend the night. Some lepers live on boats, and go about on the river begging.

Tuberculosis, syphilis, and malaria.—I have not observed leprosy in tuberculosis or syphilitic cases. The leprous cachexia seems to be antagonistic to these two forms of disease. I am not prepared to say that there is no connection between leprosy and malaria, but I have not seen marked malarial diseases in leprous patients.

Vaccination.—No data exist by which an answer to the question, "Has leprosy increased with vaccination?" can be given.

Treatment.—No treatment is curative; spontaneous cures are said to take place, in which the disease is supposed to descend from the upper parts of the body, and gradually go out at the lower extremities. Palliative measures consist in giving the patient good sanitary surroundings, nutritious food, and removing as far as possible anxiety of mind. Arsenic as a tonic and alterative is the drug which I use most. Iron and other tonics may be useful. There is a species of snake which is considered by the Chinese very efficient in the cure of leprosy.

Extract from report by a member of the French Mission, Canton, November, 1894.

(Translated from the French.)

Physical features as at page 60 ; in addition we read, "The principal cultivation is rice, and the plains, covered with rice-fields, are under water during the summer. Sugar-cane is largely grown, and so are pistachio nuts, sweet potatoes, tobacco, millet, and indigo, chiefly on the higher sandy soil. The mulberry abounds only in the delta of the Canton (the Pearl) River. In these regions the population is very dense. The mountainous country is but little cultivated. Some rare plantations of tea are to be found, with stunted pines and coarse grass. Here the population is very insignificant.

Distribution.—Leprosy is most frequent in the humid plains. The Chinese declare that the provinces of Kwantung and Fokien are alone infected, on account of the heat and damp.

Heredity.—The Chinese do not doubt the effect of hereditary transmission. Nevertheless there are admittedly certain exceptions,—as, for example, when one of the parents only is contaminated. Leprosy tends to purify itself. Thus we have two old leper hospitals in Canton dating from the seventeenth century, which contained seven or eight hundred lepers; to-day there are only a few rare cases which spring up from time to time.

Contagion.—The Chinese admit that leprosy is contagious, especially during sexual intercourse, but even by external contact, and by the effluvia from the patient, is the disease considered communicable. Various methods of communication are reported from time to time. A missionary is stated to have been beaten with a stick maliciously smeared with the blood from a leper, and to have died subsequently of leprosy. The urine of children is used as a medicine in several ailments by the Chinese, and the urine of a child tainted with leprosy is stated to have been the means of infecting a healthy person.

Food.—Neither fish nor other food has been assigned as being the cause of leprosy. Damp and heat, emanations

from the soil, contagion, and hereditary transmission are held to be the principal causes. Nevertheless an individual the member of a tainted family must practise severe asceticism if he does not want to incur the risk of developing leprosy. Heated foods, particularly beef and chicken, are prohibited.

Segregation.—All large towns in this province have leper settlements somewhere in their outskirts. The Imperial purse grants an allowance which is paid at certain times of the year for the maintenance of the lepers ; and lepers who desire to enter one of these communities must pay a fixed sum to the head man. It has happened that when a case of leprosy has declared itself the parents, after having drugged the patient, burn him alive. Usually the leper is sent to a leper village, but the richer classes keep a leprous member of the family privately in their own homes.

Varieties.—The Chinese admit thirty-two kinds of leprosy, but the moist and dry are the two chief classes ; these practically correspond to the tubercular and anæsthetic types.

Treatment.—The best is a regular life, and to have no intimate connections with the outcasts of tropical countries, whose morality is proverbially very low.

Although the Chinese boast of being able to cure leprosy I do not believe in the efficacy of their remedies ; the evil remains, at least in a latent state, and any imprudence makes it break out afresh. They have certainly some remedies which retard and relieve the symptoms, but none which radically cure. They use datura stramonium, arsenic, sulphur, mercury, and a number of secret remedies.

The Tonquinese praise highly the Wang-nam, the bark of a tree which is found in the forests of Annam. The same drug is used in France for the treatment of several skin diseases.

The Leper Village, Canton.

The leper village is situated one and a half miles outside the east gate of the city. On the way thither lepers are met with, some begging, some pursuing their course citywards to beseech alms.

In front of the village is a large pond surrounded by tall trees; around these the inmates disport themselves, and engage in such useful pursuits as rope-making, straw-braid plaiting, and such like occupations. The community turned out to meet my party (my wife, a guide, and a student interpreter, Sun Yat Sen), and was surprised to find that we meant to enter.

A brick wall faced the village, and we entered the doorway to find a roughly paved lane with low houses, all of brick and lime. Many of the inmates could only summon strength to crawl to the door of their abode to gaze on the foreigners; but the rest of the community, men, women, and children, accompanied us, and conducted us to what answered the purpose of a town hall or reception chamber. The utmost merriment was evident, children romping and calling on their playmates to look at us; and their mothers stood round, most of them with a broad good-natured smile on their faces. Not all were lepers—not by any means. I believe not one half are lepers. The inhabitants say less than half of the 650, or 300 only, are accredited with leprosy. It seems that a village existed on the spot before the lepers were driven thither by the command of the Cantonese authorities. The village aboriginals refused to move, and further, they did not object to the lepers coming; it increased their trade. Thus, with the usual divine nonchalance of the Chinese, they dwelt side by side with the lepers. Again, during the last big rebellion in China—the Tai Ping—several proscribed families sought refuge in the village, and the authorities either lost sight of them there, or did not care to follow them to their leprous den of hiding. This adds further testimony, if such were needed, to the statement that although the Chinese declare leprosy to be contagious, and so forth, they practically ignore the belief.

They made statements which refute all our notions of leprosy. They declared that not one of the non-leper residents over contracted leprosy. This cannot be believed, but from what I saw personally many of the men and women had escaped. Non-leprous people there certainly were, and my audience informed me that the majority had gone out to their work. One woman, hale and hearty, I saw

who had had *three* leprous husbands; yet she was not a leper. Healthy children were seen at the breast of leprous mothers; boys and girls of eight and ten were romping about, healthy in every respect, whilst on others of the same age leprosy had laid its foul hand. This village life is in no sense segregation, it is merely a refuge; the leper inmates cohabit with the healthy; the leprous and non-leprous children play together; the adults sally forth to beg in the streets of Canton, and enter the shops to claim food. Perhaps the most interesting feature in the village was the fact that the head man, through whose fingers all the money passes, had been in the asylum in that function twenty-two years, the longest lived leper in the community. He was reputed to be a rich man; he was certainly well dressed in fur and silk. It was January, heavy clothing was requisite. He smoked a wonderfully decorated pipe, he wore jade ornaments,—in fact, gave evidence of being a man well off. His fingers, however, were fewer than they had been, his ears were cropped close, his left eye stared when his right was closed, and his face and neck bore signs of old leprous scars. Still he was fairly strong, and all this after being a leper for a quarter of a century. It shows what good food and clothing do for the leper; it is the key-note of all treatment. In 1873 Dr. Wong, the well-known Chinaman, who was educated in medical science in England, and practised in Canton, stated that there were two leper asylums near Canton, "one having about seven or eight hundred inhabitants, and the other over a thousand;" and adds, "the greater proportion of whom, however, are merely descendants of lepers, with little or no trace of the disease upon them."

At the present moment, November, 1894, there is but one village for lepers near Canton, a distinct proof of the decadence of the disease around Canton.

In addition to the lepers met with in the village from time immemorial, several hundred lepers dwell on the river in boats.

Report by RODERICK J. J. MACDONALD, M.D.Edin., Fatshan, near Canton, May 18th, 1894.

(Leprosy a scourge, probably increasing.)

Physical features.—Fatshan is distant from Canton only fourteen miles, and the physical features of the towns are practically similar. Fatshan is on a creek of the Pearl river, which is tidal up to and beyond the city. The plain is everywhere diligently cultivated. The population is very dense.

Distribution.—Leprosy is more common in the plain, but it is met with along the waterways extending into the hilly country in the north of the province as far as Shinkwan, to my certain knowledge.

Heredity.—Hereditary transmission is believed in. Some say leprosy dies out in the third generation, some at the fifth. I have not been able to learn whether they believe that the third generation secures immunity from the possibility of contracting leprosy or not.

Contagion.—Belief in the contagiousness of leprosy is proved by their action in driving lepers out of house and home, and refusing to live with them. In country districts the Chinese are more careful to insist on segregation than in the towns. The Chinese say leprosy is contracted by sexual intercourse, by continuous contact with lepers, and by "Fung Shui" (spiritual) influence.

Food.—Many kinds of food are mentioned as favouring the development of leprosy. Shrimps, mussels, dog, duck, wild fowl, beef, spirits, goose, &c., are all regarded with suspicion by tainted families. Handling manure (human), sleeping on an infected pillow, witchcraft, measles, smallpox, dead men's "breath," night dews, and teething are among the numerous alleged causes.

Segregation.—Lepers are segregated in villages and in leper boat communities. In Fatshan lepers are allowed to beg in the streets and handle food on the stalls. Anæsthetic leprosy being less evident is not subjected to segregation, and in fact nowhere is segregation sufficiently strict to be effective.

Allied diseases.—I cannot prove any connection between leprosy and any other disease.

Vaccination.—I think leprosy is on the increase with the increasing population of the country, and that vaccination is a slight factor in the increase. Lack of efficient segregation, however, accounts for most of it.

Treatment.—I know of no native specific. Lepers have a notion that eating the flesh of a dead child will cure them. Leper women believe they can get rid of the disease by having connection with a healthy man. All modern European remedies have proved unsatisfactory.

The District and Port of Swatow.

(Leprosy a scourge.)

The port of Swatow is situated at the mouth of the Han river, and serves as the place of embarkation for the enormous coolie trade of the densely populated regions of this part of the province of Kwantung. Next to Canton it is the port from which the majority of Chinese start on their voyage to southern fields of labour, in the Malay Peninsula, the French provinces of Indo-China, the Dutch settlements in Java and Sumatra, Borneo, and the islands of the Pacific generally. It is important, therefore, to be thoroughly well acquainted with the physical features of this region, as the district of Swatow is one of the two districts where leprosy is endemic, and from whence it is spread by the numerous emigrants.

Physical features (gathered from the reports of Dr. Cousland and Dr. Anna Scott).—The prefecture of Swatow in the province of Kwantung extends along the coast of China for a distance of 150 miles, and reaches inland about sixty miles. The elevation of the plain is only a few feet above sea level; inland the hills reach a height of some 5000 feet. The plain consists of the delta of rivers, and is wholly alluvial. Vegetable mould is almost unknown, and the soil requires constant manuring. The contents of cesspools are constantly used for this purpose. Every scrap of land that can be cultivated is most carefully utilised. Rice is the chief crop, but sugar-cane and sweet potatoes are extensively

grown. The population of the plain is very dense, but no correct estimate can be formed. The rainfall is similar to that of Hong Kong, and the seasons are the same (see Hong Kong). The cultivation of rice (paddy) necessitates irrigation, and the humidity of the district is no doubt largely affected thereby.

Dr. Cousland's Report.

Distribution of leprosy.—The Chinese are of opinion that leprosy is much more common on the plains, proportionately to the population, than on the hills.

Heredity.—Belief in heredity exists to some extent. A native before adopting a child is very chary about taking a child either of whose parents is a leper.

Contagion is not believed in so long as the leper is not actually offensive from ulcers or discharging sores.

Food.—No one food is assigned as a cause throughout the entire region, but it would seem as though each locality had its own ideas; *e. g.* in one place one must not give a child certain kinds of fish, grain, fowl, or flesh for four months after vaccination, measles, or smallpox, for fear of developing leprosy. There is no general agreement as to these articles; indeed, in one place the only kind of fish forbidden is the only kind allowed in another. Coarseness of texture seems to be the one thing to be avoided in fish.

Segregation.—Lepers are allowed to move about freely; retreats for lepers are not maintained now-a-days. Formerly segregation was, in all probability, observed, for there are still villages called leper settlements; the inhabitants, few of whom are lepers, are drawing a certain amount of rice from the public funds. They also possess prescriptions and secret concoctions for the treatment of leprosy.

Tuberculosis, syphilis, and malaria.—I have not observed any connection between leprosy and any of these diseases. Leprosy is not more common in malarious districts.

Vaccination.—The Chinese affirm that leprosy has increased within the last thirty years or so, but there is no evidence to show that vaccination has anything to do with it. Vaccination was introduced about forty years ago.

Whether the increase of leprosy is general or not it is difficult to say; of the increase in some towns there is no doubt.

Treatment.—The best internal treatment is arsenic; patients at the hospital are given a month's supply of Asiatic pills. These consist of $\frac{1}{8}$ of a grain of Acid. Arseni. with black pepper, administered thrice daily. Many patients have taken these pills for a number of years with much benefit to their health.

In one town, twenty-five years ago, there were nineteen lepers; four years ago there were said to be 390. In my chief assistant's town forty years ago there were no lepers met with; now there are ten at least. The people say that leprosy was brought to the district by coolies coming back from Siam and Annam, where they had been resident for some years.

Dr. Anna Scott's Report.

Physical features.—See page 67.

Distribution.—On the hills the population is rather scanty, and leprosy is said to be more rare proportionately to the numbers than on the plains, where it is very rife.

Heredity.—The natives believe in hereditary transmission, but admit that the exceptions are numerous, and ask why it is the children of leprous parents so often escape the disease.

Contagion.—This is believed in to a certain extent only. Sleeping in the same bed, using the same towels, commodes, &c., are considered the means of infection. The Chinese do not, as a rule, fear living in the same house, sitting at the same table, or handling the same articles. They often buy food prepared by lepers, and have no fear of contagion. They also hire lepers to care for their children, and seemingly have no thought of danger.

Food.—The more ignorant class of natives assign as a cause of leprosy the eating of the Lin fish, the fighting cock, the laying hen, and the flesh of geese. The better class say food has nothing to do with it.

Segregation.—To a very limited extent is segregation

observed. I know of only two or three places where a dozen or so of lepers are separated from the people. The manner of segregation is very imperfect, the lepers being allowed to make purchases and sell their products at the common stores and vegetable stalls.

Tuberculosis, syphilis, and malaria.—I have thought I could trace a connection between leprosy and tuberculosis. The children of lepers are often consumptives.

Vaccination.—I answer a most emphatic "yes" to this question. The increase of leprosy among children is frequently remarked upon by our (mission) people, and I have been forced to the conclusion that the vaccination from arm to arm, practised by a class of Chinese (quack) doctors, has caused this very marked increase.

Treatment.—Arsenic and iodide of potassium internally, Gurjun oil and salicylic ointment externally have seemed to relieve and retard development. I know of no remedy, either foreign or native, that produces permanent good. The native drug most in use in this neighbourhood is the mugwort, and it is prepared from the leaves of *Artemisia chinensis*. This woolly substance is burnt into the tendons of lepers and the children of lepers, with the purpose of preventing the contractions of tendons.

Macau—Part of Kwantung Province.

(Leper villages.)

The little Portuguese settlement of Macau, the oldest European settlement in China, having been occupied since the year 1557, is situated on a rocky granite peninsula at the entrance to the Canton River.

I visited the leper establishment of Macau in January, 1891, and forwarded a report to the National Leprosy Fund, but have heard nothing of it since.

1. In the settlement of Macau, in connection with one of the churches, a small leper hospital is maintained for Portuguese only. Here never more than three or four inmates have been secluded at a time, and this may be

considered to represent the actual number of Portuguese afflicted with the disease. The entire Portuguese population is estimated at 4476, and taking the maximum number of lepers as four, the proportion would be just under one per 1000.

This must be held to be a very small number when one considers that the Portuguese settlers are largely Mongoloid in feature, and yellow-skinned through intermarriage with the Chinese. They dress in European style, dwell for the most part in European houses, but the poorer classes live on almost the same food as the Chinese, namely, pork and rice.

2. The male asylum for Chinese lepers is situated on an island some three miles by sea from Macau. The village is out of the road of all sea traffic, and is admirably isolated. A shelving, shallow, sandy shore renders landing in anything but a skiff impossible, and generally necessitates a long wade. Hence the very character of the coast acts as a natural barrier against leper deserters.

The village consists of some twenty huts of bamboo and palm leaves, snugly pitched on flat ground, surrounded by a girdle of low hills. These, again, serve as a prison wall, as the lepers say they have not strength to scale the heights. That they are not neglected by the clergy I had personal proof, for a service was being conducted by a native (leper) pastor during my visit. The bishop, or one of the priests, from Macau visits the settlement once a month to celebrate mass, and supplies them with stores, and such luxuries as tobacco, &c.

The lepers in January, 1891, varied in age from ten to sixty-eight years, the total number being forty. This is the nearest attempt at complete isolation I have seen, and unless the leper is confined in a high-walled asylum it is the nearest approach to perfect isolation one could obtain from the "village" form of seclusion.

A plot of ground testified to the meagre powers of cultivation, owing, the lepers say, to physical weakness on their part.

Isolation may be desirable, nay, imperative, but it is a depressing scene never to be forgotten, and a more pitiable picture than that presented by the few lepers who could

walk the hundred yards or so to see my boat leave their shore has never been painted.

3. The female village is also upon an island, but separated both from Macau and the male village island by a strip of sea some three miles in width.

Here the inmates are isolated by the natural surroundings, and housed in a well-built stone building. All necessary steps are taken by the Portuguese authorities to promote their comfort. The only danger to which the inmates are exposed is a raid of thieves, who do not hesitate to break into the asylum and steal blankets off the patients. This is especially the case at the beginning of winter, when blankets are served out. It illustrates to what depths a Chinese thief will sink, and it also bears witness to the fact of how little the Chinese fear contact with the leper or his clothing.

The separation of the sexes has only been enforced since 1885, before which time they dwelt together, but the increase in population demanded intervention.

Dr. Silva's statement as to numbers and admissions is interesting and very useful. Thirty-nine inmates were in the male village when he sent in his record, and the average annual admittance is fifteen.

Taking forty, the number of inmates at the time of my visit, as the average, it gives as the mean life of a leper (after admission) as fifteen to forty, or an average of two years and eight months. The lepers sent into the asylum are all far advanced in the disease before admission.

The number of females was twenty-five, with an average admission of six, a statement which suggests several queries.

(*a*) Do females live longer than male lepers after being attacked?

(*b*) Are female lepers secluded at an earlier stage of the disease than males?

(*c*) Is the proportion of female to male lepers always so small?

(*d*) Are the habitations and food of a better description in the female than in the male village?

These questions will be discussed in the sequel.

The Leper Village.

Answers to questions by Dr. Gomes da Silva, Colonial Surgeon.

Questions.	*Answers.*
1. What is the average number of males in the settlement ?	1. At present there exist thirty-nine. The annual average of admission is fifteen.
2. What is the average number of females in the settlement ?	2. At present there exist twenty-five. The annual average of admission is five.
3. Does the place where the lepers are settled belong to China or to Portugal ?	3. The territory is in dispute.
4. How are the lepers maintained ?	4. A boat sent weekly by the Portuguese Government to the establishment, carries food for every patient.
5. Is money sent ?	5. No.
6. Is food and clothing sent ?	6. Yes.
7. What is the average cost ?	7. About $20 (twenty dollars, or £2) per head per annum.

Remarks.—Before 1885 the patients, male and female, were dwelling together, but the population beginning to increase, not only by addition of admitted patients, but also by children born to the settled ones, the Government was obliged to interfere and separate the sexes. Since then males stay at D. Joas Island, where they live in matshed dwellings. Females inhabit a stone building on the island of Colowan, some three miles away.

Macau (Kwantung Province).

Letter from Mr. E. P. C. Werner, H.B.M. Vice-Consul, Macau.

(Leprosy prevalent; segregation practised. See Leper Village.)

Macau, a rocky granite peninsula at the mouth of the Canton river, belongs to Portugal. The Portuguese, now a half-caste people to the number of some 5000, represent the European element of the 70,000 occupants. The island is undulating, here and there low-lying, with cultivation of vegetables and rice. Average summer temp. 84°, winter 66°.

Distribution.—The Chinese lepers met with in Macao are sent to the leper asylums, one for males and one for females, on separate islands off the littoral of Macau. There they are maintained in food and clothing by the Portuguese authorities. There is a home for Portuguese lepers in the city of Macau under the care of the R. C. Mission. Two or three Portuguese lepers usually occupy the home.

Heredity.—The natives believe that the disease is inherited for three generations only.

Contagion.—The Chinese do not fear contagion, but owing to the belief in the presence of numerous germs (called worms by the Chinese) in the lepers' surroundings, infection is possible under certain conditions, *e. g.* during assumption of the squatting attitude. Sexual intercourse will transmit the disease.

Food.—No modern food has acted as a cause. Leprosy originated in ancient times, and present cases have all been transmitted from previous ones.

Segregation.—Separation asylums and separation of the sexes rigidly maintained. This endeavour to segregate lepers in Macau is the most complete attempt of the kind in China.

Tuberculosis, syphilis, and malaria.—There is no connection of leprosy with any of these diseases according to Chinese beliefs; they consider all these as new diseases, but leprosy is from ancient times.

Vaccination.—No information as to the connection of leprosy with the use of vaccine matter.

Treatment.—The flesh of the Hung-she, a very rare snake, dissolved in strong wine, and taken internally, is said to be a cure for the disease.

Observations.—(1) The number of lepers in Macau it is well-nigh impossible to estimate, as their numbers are continually being altered owing to the free intercourse with China. In the leper asylums during my (the writer's) visit in 1891 there were thirty-nine males and twenty-five females. This, however, cannot be used as an estimate of the relative prevalence of leprosy to the healthy population, as lepers are beggars and migrate freely, and some come to Macau when very feeble, on purpose to get sent to the asylum.

(2) The lower classes of the Portuguese mingle freely with the Chinese in every-day life, and their habits of life are almost identical with the Chinese. The whole class are more Mongolian than European in appearance.

Letter from Dr. Gomes da Silva, Colonial Surgeon, October, 1894; extracts.

The climate of Macau is considered to be healthy; instances of longevity are frequent. The highest land in the island does not exceed 400 feet. Rice is cultivated in the plains outside the city. Formerly large numbers of Chinese lepers were allowed to beg in the streets of the city, but now they are all removed to an island which is under the Portuguese jurisdiction, or are sent back to their native places. Many Chinese mendicants affected with the disease live in the neighbourhood of Macau. Cases of leprosy are sometimes seen amongst the Portuguese.

The summer ailments of Macau are malarial fever, diarrhœa, dysentery, and hepatic troubles; during the winter months the ailments of more temperate climates are met with. The medium temperature of Macau is 73° F., the maximum and minimum being respectively 96° F. and 42° F.

The climate is very damp and foggy during certain seasons of the year, the hygrometer marking sometimes 100°.

Island of Hainan (Part of Kwantung Province).

Extracts from report of E. H. Parker, Esq., H.B.M.'s Consul, Hoihow, Island of Hainan, China.

Physical features.—Hainan is an island off the southern coast of China, in lat. 18° N., having Hoihow as its principal seaport. Inland it is mountainous, but around Hoihow the country is a rather flat rolling plain. The town is on all sides subject to salt-water influence. Soil light and of the nature of sandstone. Cultivation everywhere; graves exceedingly numerous; population thickly spread over the plain. Good water in the town rare, and must be brought in from the country. The Chinese inhabit only the northern and western shores of this island. The aboriginal tribes are of two classes, the semi-civilised—the Shu-li; and the wild—the Shong-li. The Chinese settlers came from the province of Kwantung, where leprosy is rife. The aboriginals are allied if not identical with the Laos of Northern Siam, a mixed Caucasian and Mongolian race, at one time of great prominence. So far as is known the Chinese alone are leprous, the aboriginals never mixing by marriage with the Chinese on the coasts.

Heredity. — This is believed in universally. Sometimes the disease does not manifest itself, but eating corrupt food, especially fowls, and consorting to excess with even healthy women, are said to "bring it out."

Contagion.—The Chinese believe leprosy to be contagious only by having connection with a leper. Leprous women think they can "sell leprosy," *i.e.* get rid of it, when slightly attacked, by getting a healthy man to have connection with them.

Food.—No food is considered to be an initial cause; bad food only serves to "draw it out."

Segregation.—It is observed strictly for sleeping purposes. Lepers are made to sleep in villages apart, or if in towns they have to sleep in the streets. Further, it is not believed that mere sleeping together will contaminate; there must be contact, as by sexual intercourse, kissing, or contact of

parts naturally or unnaturally. Moreover lepers are free to beg and to hawk goods during the day.

Vaccination.— I have never heard it suggested that vaccination in any way affects the spread of leprosy.

Hong Kong.

See report by author in 1890, appendix.

Island of Formosa.

The "continental" island called Formosa (The Beautiful) by the Portuguese, and Tai-wan (Great Bay) by the Chinese, is 200 miles long, and varies in breadth from 20 to 80 miles. Through the centre runs a fine mountain range, culminating in Mount Sylvia, 11,300 feet high. The "steep-to" side is the eastern, where the coast often presents magnificent precipices. To the west the slope is more gradual, and leads to a fine plain, as shown on the map. Its area is about half that of Ireland; the Tropic of Cancer cuts its southern portion, and it is separated from the coast of Kwantung and Fokien by the Formosa Channel, which has an average width of 100 miles.

Of the geology little is known, but the usual granitic and volcanic rocks, archæan beds, and coal measures of the adjacent mainland are known to extend into Formosa.

It is even more tropical in its fauna and flora than the adjoining mainland, and the rainfall on the east side is excessive, being 74 inches at Tamsui in the north, and 95 at South Cape in the south. Otherwise the remarks upon the climate of Kwantung apply very well to it, with one exception. Along the east coast of Formosa the winter is the wet season, especially where the mountains are so high that the strong north-east wind is forced to ascend quickly. In China, on the other hand, July is the wettest month of the year.

The inhabitants belong to two races, the Chinese and the aboriginal Igorotes. The Chinese are settled on the low lands, where they have been for centuries; while the mountains and the east coast still remain to the natives, who live in deadly feud with the Chinese.

[Since this was written in 1894, Formosa passed into the hands of Japanese in 1896.]

The aborigines are of Malay stock, and still speak a dialect of the Malay language. They are distinguished by the Chinese as the Cheng Fan, or savages, and the Shu Fan, Pe-po Fan, or Pe-po Hoans, who are half "civilised," wear the Chinese dress, and alone form the bond of intercourse between the Chinese and the wild Cheng Fan. They dwell along the foot-hills on the western side of the island. The Shu Fan keep to their mountain fastnesses, and very little is known of them.

The only Chinese who have shown courage enough to cope with the aborigines are the hardy Hakkas, who of late years have been interposed between their less warlike compatriots and the daring natives, and have proved themselves a resolute foe.

The Chinese in Formosa number about 2,500,000; the amount of the aboriginal population is unknown.

We have in Formosa the spectacle of the Chinese, chiefly from the cradle of leprosy, face to face with a people of entirely different race and habits, and it is interesting to try and trace the spread of leprosy under such conditions.

Dr. Angear's letter from North Formosa brings to light the fact that leprosy was carried thither, as to so many other countries, by the Chinese. He states that the cradle of leprosy in Formosa is on the west coast, at a point where Chinese from Fokien would naturally land.

I was very anxious to establish, as a fact, whether or no the aborigines had leprosy in their midst; but except for Dr. Angear's statement that it is not known among the Pe-po Hoans, the semi-civilised natives, I have little else to go upon. Neither Dr. Myers nor Dr. Cairns, whom I interviewed on the subject, has any data to give. Surgeon-Major James, A.M.S., who travelled some distance into the interior from the south, observed no lepers even amongst the beggars.

Now the "civilised" aborigines would be more likely to contract leprosy than their wild brethren, seeing that they must have mingled with the Chinese to acquire their mode of culture. If they are free from leprosy after such exposure, it might reasonably be inferred that their small suscep-

tibility stands in good stead as a factor in the attempt to prove that leprosy is unknown among the savage aborigines. Such I believe to be the case, and though the evidence might be stronger, we may fairly look upon Formosa as a place to which leprosy has been carried by the Chinese, but that the enmity between the races has forbidden intercourse, thereby saving the aborigines from the curse of leprous infection.

Communications.

1. Dr. Angear, writing from Tamsui, North Formosa, November, 1894, reports:

"Leprosy does exist with us amongst the natives (Chinese) who reside along the west coast. In fact, almost every case comes to hospital from a place some ten miles from here; the disease is endemic in this quarter. The locality consists of a large fertile plain, populated by Chinese, and but few of the inhabitants migrate to other parts of the island. The region was one of the first places occupied by the Chinese, now some three hundred years ago, when they descended on the Formosan coast after the expulsion of the Dutch. The immigrants came from the mainland opposite, that is the province of Fokien. Among the Pe-po Hoans (civilised aborigines) leprosy is not known to exist."

2. Dr. Meyer, writing from Takow, South Formosa, October, 1894, reports:

"Leprosy does occur in South Formosa, but is comparatively very rare. Both varieties are met with; in the tubercular I have found iodoform in pills have a most marked and beneficial effect; and so has Phillipps of Jamaica, whose attention I called to it, and he reported to the B.M.A. branch in most enthusiastic terms."

3. Dr. Murray Cairns, of Tainanfu, South Formosa, January, 1895, sends a full report.

Physical features.—Seaboard. Soil very sandy. Most of land under cultivation (rice, paddy). Rainfall the usual tropical condition. Population dense in cities; large rural population.

Distribution.—The hill population being aboriginal, opportunities of observation have been almost *nil.*

Heredity.—I have not heard any expression of belief in heredity.

Contagion.—The natives may believe in it, but judging by the freedom of social intercourse between the affected and unaffected, the belief would not appear to give rise to any special anxiety.

Food.—No kind of food is assigned as a cause.

Segregation.—No instance of segregation has come under my observation.

Vaccination.—Vaccination is extremely popular everywhere, which I take to be sufficient evidence that the Chinese, who well understand the evils of leprosy, do not note any increase of leprosy with the use of vaccination.

Treatment.—Iodoform internally I have tried, and Gurjun oil, but cannot speak confidently as to results.

Korea.

(Leprosy in south ; diminishes towards north. Not a great scourge. Koreans possess a Caucasian strain.)

The mountainous peninsula of Korea forms the eastern boundary of the Yellow Sea. Down the centre of the peninsula runs a chain of high mountains, descending abruptly to the east, and more gently to the west. In this they are like those of Shin-king (see Manchuria), which they probably agree with in structure. They average over 5000 feet in height.

Except along the valley of the Yalu river, Korea has practically no stretch of low lands. Numerous streams flow to the west and south ; on the east there are many small mountain rivulets. Korea stretches from 35° to 43° N. lat.

The climate in summer is hot and moist ; the winters, especially in the north, are of great severity, and the rainfall in 1882 was thirty-four inches at Yuensan in the north-east, forty-seven at Fusan on the south-east, and thirty at Chemulpo on the west.

The natives belong to the Mongolic stock, with some obscure Caucasic affinities, and the language is intermediate between Mongolo-Tartar and Japanese, written with a true

alphabet of twenty-seven letters, though the Chinese character has of late been usurping the native and more convenient method.

The population is estimated at about 9,000,000. Many Chinese and Japanese are settled in the land, and between native and foreign corruption the country has fallen into a pitiable condition. The Koreans are possibly the laziest people in Asia, and thus are in violent contrast with their Chinese and Japanese neighbours.

They have a national dress, do not shave the forehead or wear the queue, and they are taller even than the Northern Chinese. But for their inveterate laziness—they seem to be born tired—they would be a fine race.

Laziness and dirt go together, and if these can breed leprosy the Korean ought to be contaminated. Leprosy is most prevalent in the south, and dies away towards the north, where Dr. Hardie reports "no cases;" but Dr. McGill, who lives near the same town, has seen five or six cases, but does not record whether they were seen by him in Gensan or elsewhere in Korea.

It is, however, plain that leprosy disappears as one travels northwards in Korea, and this is in harmony with the evidence from surrounding districts.

To the north of the peninsula lie Manchuria and the maritime provinces of Eastern Siberia, whence no lepers are recorded. Southward the peninsula juts into the Yellow Sea, and its shores are in the highway between Japan and Shantung. Both these countries are leprous, especially Japan; and if there is any truth in the suggestion that leprosy follows a maritime highway, then ought Southern Korea to be infected. This is in accordance with fact, but leprosy is so capricious in its distribution that it may only be a coincidence.

Careless in everything, the Korean does not attempt segregation, but leaves his lepers, as he leaves his crops, to increase as they may.

Notes taken down at a personal interview with Dr. Tatashima, Fusan, (South-east) Korea, May 25th, 1894.

(Leprosy met with.)

Leprosy is met with to a considerable extent in and around the town of Fusan; during ten months Dr. Tatashima had met with twenty cases.

Heredity.—The Koreans believe leprosy to be hereditary. The observer stated that he was a firm believer in hereditary transmission, and quoted a case where a father and mother were lepers, and then two children became so. This he regards as a proof of heredity, but on interrogation it came out that the children dwelt with the parents, and showed no signs of leprosy until they were six years of age. This only proves contagion, not heredity.

Food.—Dr. Tatashima does not believe in the salt-fish theory; such a conclusion, however, seems scarcely justifiable, as the staple nitrogenous diet of the Koreans and the Japanese themselves is salt fish.

Vaccination.—According to the statement of this observer, the Koreans of the south did not practise vaccination or inoculation (this is not quite correct); consequently, he added, smallpox is plentiful.

Segregation.—There are no hospitals or villages for lepers.

Notes taken down at a personal interview with Dr. Hardie, Gensan (Yuen-san), Korea, May 27th, 1894.

(No cases seen during a residence of fifteen months.)

Gensan is a seaport not far south of the northern frontier of Eastern Korea. Here Dr. Hardie reports "no cases" during a residence of fifteen months. This contrasts favourably with his statements concerning the other towns of Korea in which he has resided. When in Seoul he saw one case, but he was only there four months. In Fusan he met with twenty cases in a stay of two years.

Leprosy prevails in these towns in the following order, according to Dr. Hardie:—Fusan, 20; Seoul, 1; Gensan, 0;

and this proportion, 20 : 1 : 0, gives a fair idea of the distribution of leprosy in Korea, which may be expressed geographically—South Korea, 20; Central Korea, 1; North Korea, 0.

Contagion.—Lepers go freely about in the south; there are no leper villages.

Food.—Millet, wheat, and fish.

Segregation.—Not observed.

Vaccination.—Vaccination and inoculation are practised to some extent.

Leprosy seems to have made as little way in North Korea, according to Dr. Hardie, who is an American missionary, as has Christianity.

Extracts from combined report by J. F. Oiesen, Esq., Imperial Maritime Customs, and H. B. McGill, M.D., Gensan (Yuen-san), Korea, June 26th, 1894.

(Cases of leprosy met with in the north of Korea are importations.)

The main part of the population live near the sea-coast; the interior is but sparsely peopled. Houses are of mud, and of the poorest, most filthy, and insanitary description. Heavy rainfall from June to September. Spring and autumn very dry; a good deal of snow in winter.

Heredity is believed in, *contagion* denied.

Food is not assigned as a cause. Leprosy is held to be a punishment sent by the gods, or rather the devils, for transgressions, such as disturbing a grave or burying parents in an unfavourable place. Lepers may mix freely with the people; there is no *segregation* practised.

Extract from report of C. C. Vinton, M.D., Seoul, Korea, June 25th, 1894.

(Leprosy not often met with in the capital.)

Physical features.—Hill and valley is the topography of Korea. The valleys are fertile, and the population occupies the low levels. The humidity of the country in summer is intense.

Distribution.—Leprosy is pretty well confined to the plain-dwellers in the southern provinces.

Heredity is not believed in.

Contagion.—Only the more intelligent of the natives and those who have had touch with foreigners seem to regard leprosy as contagious.

Food.—No species of food has ever been regarded by the Koreans around Seoul as a cause of leprosy.

Segregation is not observed. A member of a family, particularly a slave, is sometimes turned out to beg his way from village to village.

I have observed no connection between leprosy and any other disease.

Vaccination is only just beginning to be known in Korea.

Treatment.—Neither native nor foreign drugs have any repute here as specifics.

B.—COCHIN CHINA.

(Leprosy amongst the Annamites widely spread. Segregation extensively practised.)

So many changes have taken place in this part of the world that the term Cochin China has almost ceased to be a living geographical term. As we shall use it, Cochin China is to be understood as the eastern part of that rounded peninsula which has Siam and Lower Burmah on the west. All this part is under French influence, and it includes the old states of Tonkin, Annam, and Cambodia.

It is a southern projection of China from the Tibetan plateau, and through it flows the grand river Mekong.

The climate is tropical, and much of the country is covered with dense jungle.

The inhabitants of the northern regions, Tonkin and Annam, belong to the Giao-shan group of the Mongolic stock, and (especially the Annamese) are distinctly lower in culture than the Chinese. In Cambodia we come across a very curious race, forming several tribes, of distinctly Caucasic type.

The question really asked by the National Leprosy Fund is how far the disease affects Cochin China. I take it Cochin China is considered to represent the French possessions, stretching from Tonkin on the north to Cambodia on the south—an enormous stretch of country, including people far removed in race and habits from the Chinese.

Speaking generally, we have in the north a great and fertile alluvial plain, highly cultivated, through which flows numerous rivers, of which the Songkoi is the largest. In the south a similar plain forms the greater part of Lower Cochin, the Mekong being the largest of many rivers. Between these plains, and forming the chief portion of Annam are hills and mountains which also lap round the

plains. All kinds of rocks, from Palæozoic to Tertiary, with fine coal-fields, are found in the area.

Tonkin.—This country, the northern plain, is a land of damp paddy-fields and rank vegetation. The replies from Haiphong, the capital, are very interesting, but unfortunately throw no light upon leprosy there. Dr. Touren recounts his experiences in New Caledonia, in the Pacific, and the Guadaloup Islands in the West Indies, and much of this information I have been able to utilise.

However, from private inquiries among travellers and priests, I know leprosy to be prevalent to a considerable extent. Segregation is observed, as in the neighbouring Chinese province of Kwantung to the north, and in the district of Saigon to the south.

The fact that a people segregate lepers is sufficient proof that leprosy is rife, and that the disease is so prevalent that it calls for stringent dealings. This is in marked contrast with the leprosy in Java and Sumatra. I do not mean to say that the Cantonese or the Annamites are stringent as regards confinement to the leper settlement, but any attempt at segregation even emphasises the fact of the existence of widespread infection.

Cochin China.—The term Cochin China has no more to do with China than it has with the Indian town of Cochin; it is from *Kwe-Chen-Ching*, the kingdom of Chen-Ching. Its population consists of—

Annamese	1,710,000
Cambojans	110,000
Chinese	60,000
Chams and Malays . . .	10,000
Hill-men and others . .	10,000
	1,020,000

To Mr. Tremlett, of the British Consulate, I am indebted for the communication from this district. He had much difficulty in obtaining the required information, but at last succeeded in getting Dr. Pineau to write the valuable letter I now present. It will be seen that the communication is very general, and speaks of the Annamites as a whole.

Isolation is practised here also, and in some places rigorous measures are taken in dealing with lepers. This is sufficient to establish the extreme prevalence of lepers, and from what I gather leprosy is perhaps as prevalent amongst the dwellers of the Siam-Cochin-China group of countries as in the province of Kwantung itself.

The country reported upon is marshy and damp, consisting of paddy-fields; and fits well with the Chinese belief that damp and heat are the invariable concomitants of leprosy. This may be and probably is merely a coincidence. Still Kwantung and Fokien certainly have these features in common with Cochin.

The Annamites declare that leper parents always give birth to leper children, although, on the other hand, the malady does not declare itself before the eighth, tenth, or even twentieth year. Here, again, disbelievers in heredity find the loophole for debate, and declare that this is no true example of heredity, but a mere infection by prolonged dwelling under the same roof.

In conclusion it may be stated that—

1. Leprosy is deeply rooted and widely spread among the Annamites.

2. Segregation is extensively, and in some instances rigorously, practised.

3. Heredity is believed in, although the proof is not conclusive.

4. The climate, soil, crops, and natural features are similar to those met with in the Kwantung province.

Report by C. F. Tremlett, Esq., H.B.M.'s Consul, Saigon, July, 1894.

(Mr. Tremlett obtained the valuable reports from two French doctors.)

Physical features.—Cochin China is entirely flat, consisting, indeed, of paddy (rice) fields, except that part of the coast north from Cape St. James, which is mountainous, and the higher lands near the frontier of Cambodia. Saigon itself is forty-two miles from the sea. The soil is marshy

throughout the plains; the elevated parts are of all kinds—sandy, volcanic, &c.

The greater part of the country is under cultivation for paddy (rice). On the shores of the Gulf of Siam pepper flourishes fairly well, but of other products there is little.

Cochin China covers 1361 square miles, and the population is about two millions.

There are no publications upon leprosy in this country. The disease is essentially similar to that met with in other parts.

Its spread seems to be slower here than at Réunion, for instance. Europeans are rarely attacked.

Food.—Fish or other food as a cause of leprosy is absolutely unknown.

Treatment.—Chaulmoogra oil, externally and internally, is a common remedy. Arsenic seems to do good.

RÉPUBLIQUE FRANÇAISE.

Liberté, Égalité, Fraternité.

Institut de Microbiologie et de Vaccine de Saïgon.

Notes sur la Lèpre en Cochinchine.

La lèpre est également répandue chez les habitants des plaines et des montagnes, on n'a pas signalé de différence. Les indigènes pensent qu'elle est transmissible par hérédité. Les parents lépreux donnent toujours naissance à des enfants lépreux. La maladie se déclare souvent plusieurs années après la naissance, car elle évolue très lentement. Des enfants en puissance de lèpre pouvent ne présenté des signes appréciables de cette affection que vers l'âge de huit, dix ans, et mêmes vingt ans.

Les Annamites considèrent la lèpre comme très contagieuse d'après eux on peut la contracter par et simple contact par cohabitation. L'Annamite lépreux ne se marie pas et si la lèpre se déclare après le mariage il ne partage pas le lit de sa femme de peur de lui donner la maladie. Les lépreux sont isolés dans les villages; ils habitent des cases separées

des autres, mais prennent part à tous les travaux corvées comme s'ils n'étaient pas malade.

Dans *certains régions* cependant, ils sont tenus à l'écart d'une façon très rigoureuse. Les cases et les meubles, nattes vêtements qui leur ont servi sont brulés. Ils doivent se tenir en dehors des routes fréquentées et suivre des chemins spéciaux. Ils ne peuvent pas passer sur les grandes voies de communication.

Le poisson n'a pas d'influence sur la lèpre, disent ils mais la viande de bœuf est souvent reconnue beloupeux comme cause de la maladie. Les lépreux qui mangent de la viande de bœuf ont aussitot après des démangeaisons violentes sur le corps, surtout le bras, aussi les lépreux n'en mangent pas.

Bien puqil soit *probable* que la lèpre, la tubercule, et la syphilis ait une action réciproque l'une sur l'autre, je n'ai pas de faits d'observation à ce sujet. Les Annamites n'ont pas donner aucun détail à ce sujet.

Tous ces renseignements sont d'origine Annamite.

Saïgon ; 12 *Juillet*, 1894.

Dr. J. Pineau.

(*Translation.*)

Saigon.

Notes on Leprosy in Cochin China.

Leprosy is found as much among those people living in the hills as on the plains, and no difference is observable. The inhabitants think it is transmissible by hereditу. Leper parents always give birth to leper children. The malady declares itself often several years after birth, as the disease develops very slowly. Children predisposed to leprosy would not show signs of the disease before the ages of eight, ten, and even twenty years. The Annamites think that leprosy is very contagious, and could be contracted by simple contact, even by cohabitation. The Annamite leper does not marry, but if leprosy declares itself after marriage the husband avoids his wife's bed for fear of giving her the disease. Lepers are isolated in the villages, they live in

separate localities from one another, but they take part in all ordinary labour as if they were not diseased.

In certain places, however, they are segregated very rigorously. Huts, furniture, mats and clothes are burnt. They are compelled to keep away from frequented roads and to follow special paths. They are not allowed to go on the high roads of communication. Fish has no influence on leprosy, so they say, but beef is often considered (*belonpeux*) a cause of the disease. Lepers who eat the flesh of beef are immediately afterwards seized with violent irritation of the body, especially on the arms; therefore lepers avoid it.

Although it is very probable that leprosy, tuberculosis, and syphilis have a reciprocated action one on the other, I have not made any observations on the subject. The Annamites have no information to give on the subject.

All this information originates from Annamite sources.

SIAM.

(Leprosy rife in parts ; Chinese chief sufferers ; no leper establishments in Southern Siam.)

Siam forms the greater part of the obtuse peninsula between Tonkin and Burmah. It is physically an extension of the southern part of the high plateau of Eastern Asia, where it breaks up into a remarkable series of parallel mountain ranges, each with its own river.

The magnificent river, the Mekong, flows through the country, and forms large alluvial plains reaching into Cambodia, which is practically its delta.

Geologically the country is like the Malay peninsula ; climatologically it is like the interior of South China, and is distinctly continental.

The Siamese proper belong to the Mongolic stock, but there are said to be tribes of Indonesian origin in the interior, of whom little is known. In Siam, curiously, Buddhism maintains a firm hold, probably a relic of the lost civilisation of Cambodia.

In Siam leprosy prevails to an extent which in a European country would be considered alarming. Every hamlet has its leper, and every village and town has its leper quarter. This is the information supplied by Dr. Cheek, who for ten years took careful notes in connection with this subject whilst travelling throughout the length and breadth of Siam.

The region reported upon by Dr. Cheek is in the heart of the country, a district in the northern part of Siam wedged in between Burmah and Annam. The maps place Chiang Mai in the Shan country, and represent it as the capital of this part of the country. It is difficult to obtain information from a place so out of the way, and it is owing to the

author meeting Dr. Cheek in Hong Kong that so much valuable information has been obtained. It would seem that at present segregation is observed in Siam, but only after the fashion obtaining in the leper villages in China. The leper throughout Siam is met with in the streets begging, and the idea seems to be rather to provide a shelter than an isolated asylum.

Abstracted from Official Reports.

I. *Occurrence.*—Chiefly among the Chinese.
II. *Age.*—Not stated.
III. *Race.*—Chiefly among Chinese.
IV. *Conditions.*—Not stated.
V. *Heredity.*—Siamese and Chinese say *yes.*
VI. *Disease.*—Not stated.
VII. *Contagion.*—Siamese and Chinese say *no.*
VIII. *Segregation.*—None; but certain priests attend to the lepers, and allow them to live on the premises of the temples.
IX. *Establishments.*—None.
X. *Number maintained by public.*—None.
XI. *Increase.*—Not answered.
XII. *Treatment.*—Not answered.
Authority.—Consul Kurtzhalss.

Report by Dr. Cheek.

Distribution.—I have met with no case of leprosy except among the inhabitants of the plains.

Heredity.—The natives believe in hereditary transmission.

Contagion.—Leprosy is believed by the natives to be contagious.

Food.—The natives do not attribute the disease to any particular diet. The diet of the natives is principally vegetable; they consume a considerable quantity of fish, usually dried, and also a preparation of fish in an advanced stage of decomposition. Their meat diet is principally pork. Beef is eaten to some extent, and is preferred pretty fairly rotten. The flesh of animals dead from anthrax is eaten.

Segregation.—Segregation is observed. The lepers live in a village about thirty miles south of the capital on the main river; they come periodically to the city for alms, and in fact considerable numbers of them are in the city daily, going from house to house begging.

Tuberculosis, syphilis, and malaria.—I have not observed any particular connection between leprosy and the above-mentioned diseases. The people are remarkably free from tuberculosis and syphilitic diseases. During a practice of ten years I met with only two cases of syphilis, both secondary and imported, one from Moulmein and one from Bangkok.

Vaccination.—No increase of leprosy attributed to vaccination.

Treatment.—There are no reputed native drugs. Arsenic, citrate of iron, and quinine seem to alleviate symptoms for a time.

C.—MALAY PENINSULA.

STRAITS SETTLEMENTS.

(Leprosy is rife. Chinese are the chief sufferers. Several aboriginal tribes are non-leprous. Chinese by some considered to have introduced leprosy.)

The Malay Peninsula, of which the Straits Settlements form the southern portion, comes within that remarkable zone of equable temperature which lies about the equator.

This equatorial belt possesses well-defined characteristics, unknown elsewhere. It includes roughly all the region within 12° of the equator, and is marked by a wonderful uniformity of temperature by day and night, as well as throughout the year. The greatest heat seldom exceeds 90° or 91°, and rarely falls below 74°. The maximum may be taken at 95°, and the minimum at 68°. The usual daily range is only 11°.

This remarkable uniformity is brought about by several causes. *First,* the days and nights being pretty equal in length throughout the year, there is no excess of night to cool the soil by radiation. Hence the soil is maintained at a uniformly high temperature. Thus, whereas the soil in England attains the mean annual temperature at a depth of about forty feet from the surface, in this equatorial region this line is reached at about five feet; and whereas the temperature is only 50° in the former case, it is 80° in the latter. The soil is, therefore, maintained at a high temperature day and night throughout the year. Similarly, the waters which lave the shores are heated to the same high temperature.

Second, the aqueous vapour in the atmosphere helps to maintain the high temperature; for though the degree of

humidity is not greater than in England, the quantity is much more, averaging about five times as much.

Third, the uniform high temperature is maintained by the large amount of heat liberated during the condensation of aqueous vapour in the form of rain and dew.

The rainfall is excessive, averaging about eighty inches. The whole belt is practically a forest girdle round the earth; and across these hot, damp forests no typhoons or great storms of any kind sweep to stir and vivify the air, for it is a region of almost perpetual calm.

This equatorial region is, therefore, in marked contrast to the tropical region of which Kwantung forms a part. There we have fiercer summer heat, cool winters, well-marked rainy seasons, periods of great humidity and of parching drought, and the terrible typhoons keep the air in constant motion.

In the equatorial region we have, apparently, every condition requisite for the production—for the natural cultivation—of the disease-breeding bacteria. It becomes, then, a matter of prime importance to inquire whether leprosy is endemic therein, and if so whether it is of a severer type than elsewhere.

Running down the peninsula, and forming a broken backbone to it, is a mountain system, and as a rule the country is rugged, save for the alluvial stretches which border the numerous rivers and *sungeis*, or brooks. The rocks are chiefly granite and archæan, with overlying sandstones, &c., of Tertiary age in places. Civilised life is one uninterrupted struggle against the vegetable world. Plant life is so vigorous and rapid, that a year or two of neglect serves to reduce cultivated land into secondary, but very dense, jungle.

The *ethnology* is interesting; for we have here to deal with quite different stocks from those of China. The wild tribes may be divided into the *Orang Benua*, that is men of the country, who are primitive Malays, and the *Jakuns* or *Sakai*, a Negrito people inhabiting the fastnesses of the interior. The civilised Malays occupy the coast, and all the important towns and villages, which of course are their own erections. In the ports large numbers of Chinese,

chiefly from Kwantung and Fokien, have settled as traders, some of whom are very wealthy. Other Chinese are marching inland wherever planting is making progress, and this labouring or coolie class forms quite a large section of the community in such localities. With them, generally as a somewhat higher class of plantation hands, numbers of Japanese are to be found; and there is a constant influx and efflux of these Japanese and Chinese coolies. In the trading centres, such as Singapore, Penang, and Malacca, many of the stores are kept by Tamils, Klings, and other natives of India. As an illustration of the complexity of types in the large centres we may cite Singapore, whose population is made up as follows:

SINGAPORE.

Chinese	121,098
Malays	35,992
Indians	16,035
Europeans	5,254
Other nationalities	1,776

The Indians include Tamils, 12,503; Bengalis, 3,452; Burmese, 26; Parsees, 54. Besides these there are Arabs, 806; Japanese, 287; Siamese, 211; Jews, 190; Singhalese, 159; and Armenians, 68.

In dealing with the Straits we must always bear in mind this predominance of Chinese over the native races, especially when treating of the towns. Taking the states of Singapore, Johore, Pahang, Negri Sembilan, Sungei Ujong, Selangor, and Perak, from which details are available, we find that out of a total population of 739,645 no less than 439,752 are Chinese—that is more than half. We must also bear in mind that this is not a permanent population, but one which constantly changes. The Chinaman's one idea is to amass wealth enough to return to China; hence there is an enormous yearly influx of fresh Chinese blood, and with it an equally great and constant chance of introducing disease.

We are, in the Straits Settlements, brought face to face with two commercial races, the Malays and Chinese, of dif-

ferent types, but belonging to the same great Mongolic group; and they are engaged in the fiercest struggle for existence. The Malays are essentially a seafaring race, and they have been one of the greatest travelling people on earth. From their home in Malaya they have spread and carried their language all over the East Indian Archipelago. The coasts of India are fringed with them, Madagascar is Malay in blood, in Zanzibar they abound. They visited Mauritius, and the vast area of the Pacific owes much of its native population to them; finally they have spread northwards into Chinese waters, and from the Philippines have stocked Formosa, which knows no real native race.

Now this great area is receiving another wave of immigration—the Chinese; and everywhere, and nowhere more markedly than in his own country, the Malay is being ousted by the Celestial. Nor are the causes far to seek.

The Malay is a courteous gentleman, of staid demeanour, proud of his blood, with no trace of servility, keen to resent as he is slow to give offence, brave to desperation, easy-going, careless and thriftless, a gambler to the core, and with the roving instincts of a viking. He travels because he likes it, he trades because it enables him to travel, and so long as he gets his daily wants supplied—and they are very simple and easily met in these gardens of the sun—he takes no thought for the morrow. He drives a hard bargain, and is indifferent to commercial honour; lies are as the breath of his nostrils.

The Chinaman is the opposite of all this. He leaves home to make money; and he never thinks about anything else. He can live on as little as a Malay, and though a gambler he in foreign countries prefers the safer *rôle* of keeper to the more exciting one of frequenter of fan-tan tables. He is unrivalled in driving a bargain, and as hard to get money out of as a Jew tax-gatherer. His commercial integrity is of a high standard; and once his word is pledged, he will in no way depart from it. He can be most obsequious to attain his ends; he never lets his angry passions rise to interfere with money-getting, and he has unrivalled powers of passive resistance. It is fickleness *versus* steadfastness, and the fickle Malay has no chance in the struggle. The

Chinese coolie becomes a street hawker, then a stall-keeper, and ere long the proprietor of a store, and finally he returns, a wealthy man, to his own country.

The propelling force of this resistless wave of Chinese emigration is necessity; conditions of life are hard in over-populated China, and the thrifty, patient, law-abiding native is driven far afield to seek that competence which his own land denies him. Nothing can stop this wave; and hence, in treating of the Straits Settlements in connection with the leprosy question, we must clearly realise that Malaya is as much the home of the Chinaman as of the Malay.

The Malays are subject to leprosy; there is as much evidence of its presence amongst them as amongst the Southern Chinese. Leper villages and unwritten social rules testify to the scourge, and all the natives, however secluded, know of the disease, which they call *kosta*.

Singapore is the headquarters of the British Government of the Straits. Here a large and well-appointed leper hospital affords refuge to many patients, chiefly Chinese, but a number of Malays, a few Portuguese, and occasionally a European are met with amongst its inmates.

The vexed question as to the place where leprosy developed crops up, and, as at other places, Singapore may claim that the disease is not endemic there. If not prevalent in earlier times, the presence of a leper hospital, although it may be a blessing to the sufferers, and may minimise the possibility of infection, must act as a germ-bearing and disease-producing centre, likely to render leprosy endemic to the soil.

Penang is in much the same position as Singapore as regards leprosy. In the words of Dr. Kerr: "So far as Penang is concerned, few cases of leprosy arise here; though we have a large leper asylum the cases are imported from other countries, principally China." That leprosy is endemic to the island may be denied by even an unprejudiced authority.

Perak.—In this state the Malay is being gradually ousted by the Chinese, who already form half the population. As usual the Chinese are chiefly from the provinces of

Kwantung and Fokien, Swatow and Amoy sending the chief number of emigrants.

Dr. Fox does not lay the introduction of leprosy at the door of the Chinese, yet these people are more frequently the subject of leprosy than the Malays, as shown by the Singapore and Penang asylums.

In Perak we meet with aboriginal tribes, still in a state of savagery, who, through timidity or disdain, keep aloof from the intruders, be they Malay or Chinese. Their numbers are few (5700 in Perak), and there is no evidence that they have leprosy amongst them.

Sungei Ujong.—From this state the report is confirmatory of the general statement that may be drawn from a perusal of these valuable communications from the peninsula.

The Chinese form more than half of the population, and it is chiefly among them that leprosy is found; indeed, the Malays in Sungei Ujong are quite free from it. The Sakais or aborigines are not reported upon by Dr. W. L. Braddon.

Johore.—Dr. Wilson, writing from Johor Bharu, the capital of the kingdom, on the strait which separates Johor from Singapore island, conveys the information in his letter that the Chinese are again the offenders. Out of thirty cases three were affected before landing, and the remaining twenty-seven developed the disease in the district. We are not told whether the men affected herded with the unaffected, so that it is impossible to ascertain when or how the disease was acquired; it may be because leprosy is endemic in the neighbourhood, or it may be that their leprous countrymen spread the contagion directly to their fellows.

An interesting statement is made that the aboriginal Sakais are reputed to suffer severely from leprosy, and that they compel their lepers to dwell apart. Dr. Wilson reports that though he travelled many miles inland he never saw a leper. He met with many cases of pityriasis and ringworm, which might be mistaken for leprosy by ignorant people. Still Dr. Wilson does not doubt the statements he has heard, and the fact of Jakuns being met with *minus* toes, &c., seems confirmatory.

From the Muar district, which abuts from Malacca,

Mr. Wheatley bears out the statement that leprosy is chiefly met with among the Chinese. There are 15,000 Javanese in the province, and though Mr. Wheatley mentions them, he does not speak of leprosy amongst them.

Very great interest attaches to leprosy in the Muar district, for it is the region in which gurjun oil is produced. The high esteem in which this oil is held must have originated here, and yet we find ourselves reporting upon leprosy at one of its foster-beds.

Mr. Wheatley remarks that he has seen few lepers, and that it is the Chinese who are mostly (if not wholly) affected. Ringworm and pityriasis are very prevalent, and the oil is freely used for these ailments. May not the Malays and Jakuns include ringworm and pityriasis amongst the mild forms of leprosy, as did the Israelites of old (see report on Hong Kong), and as do the Chinese (*ibidem*) at the present day?

Mr. Wheatley says he has seen the oil do some good in the early stages—a valuable communication, but a feeble testimonial to its virtues from the resident medical officer in the gurjun oil district.

The evidence from the Straits Settlements strengthens the opinion that has been forcing itself upon me ever since this investigation began, namely, that the Chinese are the carriers of leprosy; but the facts are not exhaustive enough to warrant more than a cautious suggestion to that effect. Still, it is very remarkable that even in Malaya itself it is the Chinese who are the greatest sufferers; and as not one of these Chinese in a hundred is born in Malaya, and few remain many years, and as we know that leprosy is happily very slow of incubation, it certainly does seem more and more likely that leprosy is being constantly brought in afresh from infected Kwantung and Fokien. The Chinese mix very little with any but their own people; and though leprosy is undoubtedly endemic in some parts of the Straits, its comparative rarity among the Malays is hard to account for except on the theory that the Chinese introduced it, and by their exclusive habits have not spread it as widely as they might otherwise have done.

To look at the matter from another point of view, the Malays and the aborigines seem comparatively free from the

scourge, yet the Sandwich Islanders, their relatives in blood, are the most leprous people on earth. How can this anomaly be accounted for? It may be, though it is only a suggestion, because the habits of the Malays and Hawaiians are so different. The Malay is a born rover, he is always coming in contact with other people, and his constitution is inured to change. The Hawaiian, on the other hand, is an isolated being, who till less than a hundred years ago never saw a soul but of his own race. Such isolated communities are always prone to new diseases, as we may see even on the little island of St. Kilda, and hence the Hawaiian constitution was more fitted for the reception of leprosy than that of the Malay.

The information received from the Malay Peninsula justifies us in drawing the following conclusions:

1. In the Straits Settlements leprosy is rife.

2. Three leper hospitals have been found necessary, viz. Singapore, Penang, and Johor Bharu.

3. The Peninsula is inhabited by Malays, Chinese, Japanese, Indians, and aboriginal tribes.

4. In the places reported upon the Chinese population equals or exceeds the native Malay race.

5. Chinese are the chief sufferers from leprosy.

6. Chinese form the largest number of the leper patients in the hospitals.

7. Some Chinamen were lepers on landing, but the majority developed the disease during a residence in the Settlements.

8. Jakuns are reported to have leprosy amongst them to such an extent that they have adopted compulsory segregation. No Jakun has been seen by any of the contributors to have actual leprosy on him.

9. Gurjun oil is produced in the Muar district of Johor, but is not, at all events, a prophylactic against leprosy.

10. Whilst inclined to lay the presence of leprosy in the Straits at the door of the Kwantung and Fokien immigrants, the facts will scarcely justify the conclusion.

11. Whether imported recently or not, leprosy is now endemic in the Straits Settlements.

12. Vaccination is not accused, in any place, by any people as a contributor to the spread of leprosy.

Johore.

Report by Dr. J. P. A. Wilson, Senior Medical Officer, Johore, July, 1894.

(Leprosy prevalent. Chinese more leprous than Malays; Jakuns [aborigines, perhaps a Negrito tribe] have never been *seen* to be leprous.)

N.B.—The first glance at Dr. Wilson's paper would lead one to believe that the Jakuns were leprous, but on reading more carefully it will be seen that the information as to their being leprous is mere hearsay. Dr. Wilson has taken great pains to elucidate the point; he has himself made extensive journeys into the Jakun country, and his assistant at Muar—a neighbouring district—has reported at length. Dr. Wilson found many skin diseases, but no leprosy.

Physical features.—The territory of Johore, including Muar, extends from Pahang on the east side to Muar on the west, being surrounded by the sea on three sides. Chains of hills run along both the east and west sides, but are very much broken up; the highest hills vary from 2000 to 3300 feet in height.

Most of the plantations are situated inland, and are reached from the numerous rivers. These at their mouths are generally great tracts of mangrove swamp, but further inland are bordered by sloping lands rising toward the mountain ranges, and are under cultivation as gambier, pepper, and coffee plantations.

Along the sea-board the land is flat and sandy, and cocoa-nuts and areca nuts are principally cultivated. Further inland, where the land is higher, pineapples are grown; in addition to cultivating these plantations the Malays and Chinese settled on the coast engage largely in fishing.

The population is extremely difficult to estimate, probably about 150,000 excluding Muar.

The population of the town of Johor Bharu, the capital, is about 1500, mostly Chinese.

The average rainfall is 106 inches; the average maximum temperature is 84° F.; the average minimum temperature is 72° F.

The Chinese outnumber all other races—Malays, Japanese, and aborigines—as three to one.

Distribution.—Most of the lepers, admitted to the leper ward of the Johore Hospital, are Chinese from the plantation flat ground along the various river banks. It has been reported to me that leprosy is very prevalent among the Jakuns (original inhabitants) in the interior and unopened districts. They generally have their villages at the river sources among the great ranges of hills. When affected by leprosy they are stated to voluntarily segregate themselves in small villages, and are avoided by the other Jakuns. In several inland journeys I made I came across Jakuns suffering from severe pityriasis or advanced body ringworm, *not leprosy*.

Heredity.—The natives, both Chinese and Malays, believe in hereditary transmission. I have reported two cases where leprous Malays had leprous children. Out of thirty Chinese patients, twenty-seven denied hereditary transmission, three acknowledged it and gave the following histories:—One had a father and two uncles lepers; a second had a leprous father; a third had a paternal uncle a leper.

Contagion.—Both Chinese and Malays believe leprosy to be contagious.

The Chinese state that if a healthy man urinates or defæcates after a leper, he is likely to contract it.

The *Malay theory* is, that if they have sexual intercourse with a menstruating woman, and she conceives, the child will be leprous.

I have under observation two Chinese who keep leprous women for the last two years. They have shown no signs of leprosy so far, and they state they do not consider leprosy contagious.

Food.—Fish is never given as a cause, and as the population here live almost entirely on fish, I think leprosy would be much more prevalent if it were a cause. The Chinese state that if a duck or goose or old cock is eaten by any one suffering from smallpox, or any exhausting disease, leprosy will follow; five out of thirty patients gave this cause.

One Malay gives as the cause of his leprosy the cutting up of a dugong or "sea-cow;" this was followed by intense skin irritation, "itching and burning," and the leprous tubercles developed shortly afterwards.

Segregation is observed very imperfectly by the Chinese and Malays. They generally compel the leper to live and eat apart from the rest of the household. At the Johore Hospital the leper ward is situated in a marsh as inaccessible as possible, all food and clothing is kept separate, but the ward is too near the town, and abscondings and night visits to town are too frequent.

Tuberculosis, syphilis, and malaria.—I have noted several cases in which the first signs of leprosy were with difficulty diagnosed, owing to the syphilitic history. Out of thirty patients in hospital twenty give a history of syphilis; one contracted syphilis after the signs of leprosy had appeared.

Malaria.—Ten out of thirty had suffered severely from malaria, and continued to do so after leprosy was developed.

Tuberculosis.—One out of thirty suffers from pulmonary tubercnlosis.

Vaccination.—I have met with no cases. [This question, "Has leprosy increased with the use of vaccination?" has evidently been misunderstood.]

Treatment.—Chaulmoogra oil and gurjun oil internally and locally seem to afford relief. Marked improvement has followed the use of arseniate of iron in a few cases. I have not heard of any native drugs being used with success.

Perak.

Report by Dr. Gundry Fox, Perak, Straits Settlements.

(Leprosy wide-spread. Aborigines [Sakais] not known to be leprous. Malays extensively affected. Chinese extensively affected.)

Physical features.—The state of Perak, situated on the western aspect of the Malay Peninsula, between parallels of 3° 45′ and 5° 29′ north latitude, and 100° 22½′ to 101° 40′ east longitude, has a coast-line about ninety miles in length

and its size is estimated at about 10,000 square miles. The country is well watered with rivers, mountain ranges abound, and in some parts reach altitudes varying from 7000 to 8000 feet. Everywhere the land in its natural state is covered with thick jungle. There are no towns on the hills, only a few houses, which are used as sanatoriums for Europeans. Thaiping, the capital of Perak, is situated at the foot of a range of hills, the highest of which is about 5000 feet in height. The soil is very rich, and has been proved to be suitable for the cultivation of coffee, tea, cocoa, pepper, cinchona, and cardamoms. Although a Malay state, nearly half the entire population are Chinese, and are the real workers in the state; all the mining and trade are in their hands. Malays are a lazy, unambitious race, too indolent to be other than contented and polite; they are not prolific, families of more than two or three are rare; and owing to their ignorance and supreme indifference to medical and sanitary knowledge the death-rate among them is high. A Malay's chief occupation is the cultivation of his land, together with fishing; he is a good sailor, being very active in a boat. Physically they are a small race, average height 4 feet 10 inches to 5 feet, but perfectly symmetrical in proportion.

At the census of 1891 the population of Perak was 214,254, of which 96,719 were Malays, 94,345 were Chinese, and 366 Europeans. The average mean temperature is about 70° F. in the night, and in the day 87° F. There is no cold weather or any real wet season; the atmosphere is very moist. Rainfall is about 100 inches a year, more in some stations situated near a range of hills.

Distribution.—Leprosy is commoner among the dwellers on the plains. The aborigines, about 5779 in number, usually inhabit the hills; they are very timid, and generally run away at the approach of strangers. I have never heard of any of them being lepers, but it is very difficult to ascertain their true condition.

Heredity.—Speaking generally, the Malay inhabitants do not believe in hereditary transmission. It is but seldom that all the members of a family are similarly affected; sometimes one, sometimes both parents are lepers, and the

children are found free from disease, but occasionally one or more of the children are lepers when the parents are not leprous.

Contagion.—The Malays believe leprosy to be contagious, if their opinion can be gauged by their treatment of leprous people. They compel lepers to dwell apart, and exclude them from all social and domestic rights. Lepers usually inhabit humble dwellings on the outskirts of their native village.

Food.—No food is assigned as a cause of leprosy; all Malays eat fish, fresh and dried.

Segregation.—Malays of their own accord have adopted a system of segregation. A husband developing leprosy is at once separated and lives apart from his wife, who takes all the children with her; or if the wife becomes diseased, the same plan is adopted. Arrangements are now being made by the Government to compel lepers to live on an island, which they will not be permitted to leave, at the same time giving them land, and generally trying to make their lives as little miserable as possible.

Tuberculosis, syphilis, and malaria.—As far as my observations go I have failed to recognise any connection between leprosy and tuberculosis, syphilis and malaria. I consider them quite different diseases. While travelling in the interior two years ago, in search of lepers, I found several Malays who had leprosy suffering from malarial fever.

Vaccination.—There has been no evidence to show that leprosy is increasing in Perak, although arm-to-arm vaccination has, until quite recently, been in vogue for the last ten years. There is no case on record where leprosy has been contracted through vaccination.

Treatment.—Lepers are usually treated by rubbing in gurjun or chaulmoogra oil, with arsenic and cod-liver oil internally; most cases improve at first, but soon the disease appears to develop unchecked. I know of no reputed native drugs.

Muar.

Report by Dr. J. J. L. Wheatley, Muar, Malay Peninsula, dated July, 1894.

(Leprosy uncommon. Chinese suffer mostly; Malays rarely. Aborigines not commented upon.)

N.B.—This is the region whence gurjun oil is obtained.

Physical features.—The Muar district is very varied in feature. Skirting the sea-shore is a belt of low swampy ground, fringed with mangrove for about a depth of a quarter to one third of a mile. Further back is an extensive alluvial plain, flat country elevated but a few feet above spring tides. This plain is about thirty miles long and about ten miles broad, reaching to the bases of groups of isolated hills about some twelve miles from the chief town (Bander Maharani). The Muar River, which takes its source somewhere about 120 miles in the interior, runs a very tortuous course through this alluvial plain, and almost at its very mouth the town has been located on the southern bank. The soil of the plain is almost entirely alluvial deposit, clayey to a very considerable depth, and, except in places where settlements have been made, is covered more or less with rank grass and scrub. There are extensive timber forests in the far interior. The chief cultivation of the district is the areca palm, producing the betel nut; but in the higher reaches of the river, where the soil is good loam, Chinese settlers cultivate gambier and pepper. Of late years tapioca and Liberian coffee have also been introduced, and promise well.

The rainfall, as observed at Bander Maharani during the past five years, shows an annual average of 94·92 inches; the greatest annual rainfall being 106 inches, and the least 84·87 inches. The average annual maximum temperature is 88·4° F.; the average annual minimum temperature is 74·1° F.; the highest recorded reading is 98·5°, and the lowest 68·2°. Strictly speaking, there are no seasons. The period from May to October is the south-west monsoon, during which the rainfall is greater than from November

to April, when the north-east monsoon is prevalent. The average number of rainy days during the year is 167.

It is difficult to form any estimate of the population of the Muar district. The Chinese have settled in large numbers, chiefly along the river banks and its neighbourhood, cultivating pepper and gambier, and may safely be estimated at about 75,000. Javanese, who reside chiefly in the padang or plain, having plantations of the areca palm, perhaps number about 10,000; and interspersed throughout the district the Malays, perhaps about 10,000. These figures are only approximate, and are not to be relied on.

Distribution.—There have been very few cases of leprosy observed in the district, and as the people are very migratory, it is not possible to give a definite reply to this question. Leprosy is seen chiefly amongst the Chinese, very rarely among the Malays.

Heredity.—The natives, Chinese and Malays, believe leprosy to be hereditary.

Contagion.—All believe in the contagiousness of leprosy.

Food.—Fish is not assigned as a cause. It is the most common adjunct to rice by those dwelling on the seaboard. Salt fish is much used by the inland tribes.

Segregation.—No strict segregation is practised, nor is it possible under the conditions in which the natives live; but every care is taken to avoid contact with lepers.

Tuberculosis, syphilis, malaria.—No direct connection between leprosy and any of these, but very often evident traces of secondary and tertiary syphilis are combined with leprosy.

Vaccination.—No data. [Dr. Wheatley does not state there is no vaccination for smallpox practised.]

Treatment.—The natives have no reputed drugs for leprosy. In the Muar district, where wood oil (gurjun oil) is very plentiful and an important item of export, it is very generally used for all skin affections. The various classes of aborigines suffer much from an aggravated form of ringworm, in which the epidermis scales off in flakes; for this and other skin diseases the wood oil is greatly used, generally *after* having tried the leaves of *Cassia alata*, which

grows plentifully in all waste lands. The leaves are ground into a paste with lime juice, and applied freely to the parts affected, but I cannot say that it generally proves successful.

So far as I have seen tried, the inunction of gurjun oil made into a saponaceous emulsion with lime water, and the internal administration of gurjun oil or chaulmoogra oil, give a certain amount of relief even in well-marked cases of leprosy; but there is no actual curative effect. In the early stage of the disease it perhaps arrests the development. I have not seen more than this.

J. J. L. Wheatley.

Penang.

Report by Dr. W. Kerr, Penang, May, 1894.

(Leper asylum in Penang. Chinese chief occupants.)

Dr. Kerr writes:—"So far as Penang is concerned, few cases of leprosy arise here. Although we have a large leper asylum, the cases are imported from neighbouring countries, principally China. That being the case, I am not in a very good position to answer the queries or give any information of value."

Penang is an island between Sumatra and the Malay Peninsula, situated at the north end of the Straits of Malacca. It lies in latitude 5° 20′ N., and extends fifteen miles by five. It is the great mart and trading centre for a wide district, and is a shipping port of the first magnitude. A leper hospital is an essential feature in a cosmopolitan centre of the kind when situated in the midst of leprous peoples. Not only does the great Eastern focus of Chinese leprosy, Canton, send its emigrants hence, but the port of Penang is also open to infection from the north—Ceylon, India, and Burmah; and from the south—Sumatra and Java.

The leper asylum is placed on a small island in the strait opposite the chief city.

Sungei Ujong.

Report by Dr. W. L. Braddon, F.R.C.S., dated Sungei Ujong, Malay Peninsula, July, 1894.

(Leprosy rare. Chinese only sufferers. Malays not affected. Aborigines not reported upon.)

Physical features.—Sungei Ujong is a territory some 500 square miles in extent, bordering on the shores of the Straits of Malacca, in latitude 2° 8′ north.

The country consists of dense jungle, many streams, and mountains rising to the height of 4000 feet. Cultivation is sparse and mostly of rice (paddy) in valleys and hillsides, but besides rice, coffee, cocoa, tapioca, pepper, and gambier are raised.

The population consists of Chinese mainly, dwelling in scattered hamlets. Rainfall (mean annual) 85 inches. The original inhabitants of the peninsula—Sakais,—driven by Malay invasions from the coast, form the very thinly scattered population in the jungles of the hills. The Malays, who constitute the present "natives," occupy the valleys, and are not numerous, the Chinese immigrants forming more than half the population. Although the Malays incur leprosy, I have noted no cases in this state; the very few cases coming under observation are Chinese immigrants who have contracted the disease before entering the country.

Heredity is not believed in.

Contagion.—Leprosy is regarded as contagious.

Food.—No food is considered to be a cause of leprosy.

Segregation is not practised.

Vaccination.—It is not possible to estimate the relation between vaccination and leprosy.

Treatment.—No native remedies are known here.

D. BATAVIA.

EAST INDIAN NETHERLANDS.

[*Abstracts.*]

(Leprosy prevalent but decreasing. No distinctions of race; not contagious. Moluccas most infected. No leprosy in North Celebes or Sunda Islands.)

Report by A. F. McLachlan, Esq., Acting British Consul, Batavia, June, 1894.

Mr. McLachlan sends a report from the medical department of the Dutch East Indian Army on the subject of leprosy.

Abstracts from Official Reports on Leprosy.

I. *Occurrence.*—Affects natives and Europeans; the latter not till after two years' residence.

Forms.—Maculosa, tubercular, anæsthetica.

Distribution.—More frequent in Moluccas than Java; absent from North Celebes and Sunda Islands.

II. *Age.*—Leprosy may appear at any age from childhood upwards.

III. *Race.*—Equally among Europeans, natives, Arabs, and Chinese.

IV. *Conditions.*—Commoner on the seaboards than in the mountain ranges. Drunkenness and want aggravate the disease.

V. *Heredity.*—Lepers always produce healthy children; but these sometimes have become leprous in after years.

VI. *Disease.*—No proof of any correlation with syphilis, framboesia, &c.

VII. *Contagion.*—"Not one case ever recorded."

VIII. *Segregation.*—Yes, up to 1865, when the Government, from experience, rescinded the regulations.

IX. *Establishments.*—Fourteen hospitals up to 1865, eight then gradually abolished, six still (1886) serve as voluntary asylums for lepers. In 1883 there were 189 inmates.

X. *Number maintained at public expense.*—See above.

XI. *Increase.*—No reply.

XII. *Treatment.*—All treatment ineffectual. Temporary benefit only.

It is curious that in the West Indian Netherlands, and in Surinam, segregation is very strictly enforced.

Authorities.—Spenger van Eyk, Colonial Minister, Holland; Dr. J. van Deventer.

The East Indian Netherlands comprise *Sunda Islands, Borneo* (part), *East Timor, West New Guinea, Java, Madura, Moluccas, Celebes.*

Sumatra.

(Leprosy is frequent. Chinese are the chief sufferers. Natives almost exempt. Koch's tuberculin used as a treatment.)

This great island, 1070 miles in length, is, like Borneo, bisected by the equator, and therefore comes within the equatorial region of climate. Its average breadth is about 200 miles, and its area about 128,000 square miles. It is, as are all the Sunda Islands, fully exposed to the Indian Ocean and the south-west monsoon along its south-eastern coast.

It is traversed by a fine range of mountains, rising to 15,000 feet, mostly volcanic, and on the east side is bordered with plains. In addition to volcanic rocks, it contains archæan beds, and wide stretches of coal-bearing sandstones of Tertiary age. Much of the eastern side is an alluvial plain but little elevated above sea level, and liable to floods. This great plain covers about 40,000 square miles.

Owing to the lie of the land, most of the rivers flow eastwards. It possesses fine mountain lakes.

The inhabitants consist of Malays, and several Indonesian tribes which belong to a pre-Malayan period. The Malays occupy most of the area, and have from time immemorial had permanent settlements in the districts of Menangkabau and Palembang, and from this centre a large proportion of the Malay migration has started.

The Indonesian tribes, the true aborigines, include the Battacks of the north, the Kubus of Central and the Passumahs of South Sumatra. The Achinese of the north, a mixed race, have never been subdued by the Dutch.

It should be noticed that Sumatra is not included in the list of places to be reported upon published in the 'Medical Journal,' to which this report is a reply.

Batavia is the place named. Surely some mistake is here? Batavia is merely a city in Java, its capital. After asking for information over such huge areas as the Chinese Empire and the Malay Peninsula, and the Pacific, to suddenly drop down upon a mere town seems irrelevant; so I have taken the liberty of returning replies from Sumatra as well as Java.

Dr. Graham's communication emanates from Lankat near Deli, the centre of the celebrated tobacco district, and the information he gives is the more important on that account.

The racial representatives enumerated agree with the observations in Java and the Malay Peninsula as to the relative susceptibility to leprosy. He mentions one European as attacked; this is interesting, as in most leprous countries a case occurs once in several years. The Netherlands minister, in a report to the Hawaiian Government, states that a few European lepers return to Holland. The explanation Dr. Graham gives of his patient is valuable, as all such illustrations are eagerly sought after; and it is in accord with other evidence collected in the course of this inquiry. It is a vital question to Europeans dwelling in a leprous country; and when we find that intimate and prolonged contact is necessary, it serves to allay the dread some people entertain. On this point see also the case related by Dr. Wong, of Canton.

The Chinese are in Deli and the district the principal offenders as usual, and once more a statement bears proof

of the Chinaman as the leper-carrier in the Far East. Dr. Graham writes, "Nearly all my cases have been among Chinese immigrants; among the native proper the disease is rare." This might be taken as the report from all the countries to which the inhabitants of Kwantung and Fokien emigrate; it is the reply from the islands of the Pacific, from Australia, California, and all the countries bordering on the China Sea.

Vaccination is promptly denied by Dr. Graham as being reputed by the natives to have increased the number of lepers. Here be it observed, moreover, that the Dutch Government are very exacting as regards the immigrants being vaccinated before they are employed on the various plantations.

The statement that Koch's tuberculin had a decided effect will be dealt with under the heading "Koch's Tuberculin in Leprosy," by the writer.

Letter from J. C. Graham, M.A., F.R.C.S., M.D., Lankat, Deli, July 22nd, 1894.

My report deals with leprosy in the lower division of Upper Lankat. Among the natives proper, viz. the Malays and Battaeks, it is almost impossible to get any reliable information.

Physical features of Lankat:—A large plain about 100 feet above sea level, distant from the sea about 20 miles. Soil mostly clay, but very variable in colour and consistency. Tobacco is principally cultivated, here and there in higher-lying districts a little pepper and coffee.

The area of the district reported upon is about 160 square miles.

The population consists of—Europeans, 216; Chinese, 13,592; Bengalis, 1282; Malays, 12,727; Bandgerese, 1204; Battacks, 16,702.

Leprosy is met with almost exclusively amongst the Chinese; one European contracted the disease in Lankat seven years ago; two cases of leprosy only have I seen amongst the Bandgerese, and three amongst the Bengalis.

Distribution.—I have no statistics as to the relative

frequency of leprosy amongst dwellers in the hills and plains.

Heredity.—The natives believe in hereditary transmission.

Contagion.—Natives believe leprosy to be contagious.

Food.—No kind of food is assigned as a cause.

Segregation.—There is a small wooden hospital in the vicinity of the principal town of Deli—Medan, which is far from sufficient to meet the increasing demands for admission. Nearly all my cases occur among Chinese immigrants; among the natives proper the disease is rare.

Tuberculosis, syphilis, and malaria.—I have observed no connection between leprosy and any of these diseases.

Vaccination.—Leprosy has not increased with the use of vaccination.

Treatment.—Tuberculum Kochii had a very decided effect on two cases, but I lost sight of them. I have seen improvement with chaulmoogra oil, and also with mercury and iodide of potassium. I am now using the raw thyroid gland of the pig with apparent good result in a case of leprous ulcer of great toe, but cannot claim a permanent cure in any one case.

Rainfall observations, 1890–94.

Monate.	1890.		1891.		1892.		1893.	
	Dage.	Mm.	Dage.	Mm.	Dage.	Mm.	Dage.	Mm.
Januari . .	12	147	10	354	8	230	4	106
Februari . .	12	139	9	115	3	82	8	239
Maach . . .	3	56	5	42	7	178	8	79
April . . .	13	197	6	23	11	301	11	256
Mei . . .	12	196	9	210	12	212	15	218
Juni . . .	5	80	9	152	5	116	8	109
Juli . . .	9	128	4	47	6	111	12	200
Augustus . .	16	228	16	231	12	108	13	222
September . .	18	414	15	370	12	108	9	173
October . .	22	532	11	252	17	340	12	223
November . .	14	428	18	305	10	169	19	492
December . .	6	66	12	212	15	312	7	110
Totaal . .	142	2611	124	2313	118	2267	126	2427

Java.

(Leprosy rare. Chinese mostly affected. Of four hospitals three are for Chinese. Where Chinese coolies come, there is leprosy prevalent.)

Java, the richest and most populous of the East Indian Islands, is 622 miles in length, and has an area of about 52,000 square miles. The island of Madura is physically and politically part of it.

It is traversed by a double range of mountains, knotted together in places, and rising to over 12,000 feet. Fine plains exist in the north, and it has many rivers, the chief of which flow northward into the Java Sea.

Its mountains are eminently volcanic, forty-six being true volcanoes, twelve of which are active.

The rainy season is during the winter monsoon, and the climate at sea level is equatorial, but is mild and salubrious in the highlands.

The natives belong exclusively to the Malay race, and here attain a high degree of culture, chiefly under Hindu influence.

The Netherlands minister reports that leprosy is rare in Java, but more frequent in Madura. He states that the disease attacks equally Europeans, natives, Arabs, and Chinese; a statement that must be read in the light of fuller reports, as it can only mean that lepers have been known among all these races. As a matter of fact, the Chinese form by far the greater proportion of the lepers.

The British Consul at Batavia kindly sent a copy of an official inquiry into leprosy in Java, and the report will be read with interest.

Formerly, that is up to 1865, there were fourteen leper hospitals in the Netherlands East Indies, but as the disease was neither very prevalent, nor considered contagious, they were gradually abolished, until in 1886 there were only six, and now only four, all voluntary establishments. Dr. J. van Deventer distinctly says, "The number of sufferers (in Java) being always very small."

Of the four existing hospitals, one is for lepers of all

nationalities, but how the numbers are distributed is not stated. The other three are significantly stated to be for Chinese natives, and one of these is supported by the Chinese. The Chinese are placed first, as no doubt they required a retreat more urgently than the other natives; in fact, Mr. Powell goes so far as to write that "leprosy is met with everywhere, only it is said to be imported by the Chinese; it seems to have been unknown before the arrival of the Chinese in Java." Mr. Skertchly suggests that this should be taken as meaning "since Chinese coolies began to arrive."

Another significant fact is that all the existing leper hospitals are on the north coast, to which, in fact, the Chinese flock.

It will be seen in the report on the Malay Peninsula that leprosy is not met with among the Javanese immigrants, and Mr. Skertchly tells me the same is true in North Borneo.

I am not prepared to discuss the statement that the Chinese actually brought leprosy into Java (see Skertchly on the physical conditions, &c.), but I can well believe that the prevalence of Chinese in Batavia caused an actual and relative increase in the number of lepers among the natives. The great tendency is to disclaim leprosy as existing or arising in the district one inhabits; it is the same here in Hong Kong as elsewhere; not only merchants, but several medical men, have said to me, "But there is no leprosy in this neighbourhood, is there?" and that, too, in the very home of leprosy, for Hong Kong is but a suburb of Canton as regards its disease register, the communication being so free.

The course of the recent epidemic of plague will bear me out in this statement, and we have a constantly recurring proof afforded by the wave of smallpox.

Report by B. W. Powell, U.S. Consul, Sourabaya, September, 1894.

(Leprosy everywhere. Imported by Chinese. Unknown before.)

Physical features.—The city of Sourabaya is very low-lying, close to the sea; the soil is composed mostly of hard

clay; the people cultivate sugar-cane, rice, and all sorts of vegetables. Rain falls from December to May. Leprosy is met with everywhere, only it is said to be imported by the Chinese, it seems to have been unknown before the arrival of the Chinese in Java.

Distribution.—Leprosy is met with in all latitudes of Java.

Heredity.—The inhabitants believe that leprosy is handed down only in those families which are tainted by the disease. Sometimes it occurs in each generation, sometimes only in the second, third, or fourth does it reappear.

Contagion.—The natives do not consider leprosy to be contagious; they will marry a girl from a contaminated family, not thinking of the danger to their children. No man ever became affected by marrying a girl from a leprous family.

Food.—No food is considered capable of developing leprosy. A sea-fish named the "moonsing" when eaten causes huge white blotches upon the skin; this is not contagious.

Segregation.—In Java there is one establishment where lepers are segregated. Could this be done universally we would soon see the end of this sickness.

Tuberculosis, syphilis, and malaria.—As regards tuberculosis and malaria no connection is traced. Syphilis may be, but the only real cause of leprosy is said to be what the French call "christalline" (the syphilis produced by Sodom).

Vaccination.—Question misapprehended.

Treatment.—The best drug used is still the Boston (U.S.) remedy—cuticura, but it does not seem improvable. Natives have no drug whatever for leprosy.

There is a native superstition that in its early stage leprosy can be checked by introducing into the veins of the arm a small diamond or a small piece of gold. In this case the body, they say, gradually dries up, having eventually the appearance of a walking mummy.

An inquiry made all over Java, beyond producing some statistics of little value to the points at issue, brought nothing new to light.

"A positive opinion regarding the hereditability and contagiousness of leprosy can only be established by extended,

careful, and frequent observation ; the period of incubation being long, and the prodisposition small, it is impossible to draw conclusions from a short series of observations. The necessary leisure for such studies is precluded to most medical officers of the Dutch East India army, owing to the extent of their duties ; whilst the matter is further impeded by the small number of cases which are offered for their investigation.

"According to reports received, leprosy is not often met with in Java. In Madura, however, it may be said to present itself more frequently. The Rembang district is the principal centre of the disease in Java.

"The opinions of the different officers, based as they are on insufficient data, vary considerably.

"Hereditability and contagiousness find both opponents and supporters, but neither side can advance conclusive proof ; though most officers are inclined to follow the present prevalent opinion as to contagiousness, they at the same time believe in hereditability."

"There are four leper hospitals in Java, the principal of which is that at Pekalangan, Mid-Java, where sufferers of all nationalities are taken in. The three others, in which only natives and Chinese are treated, are the Chinese hospital at Batavia and Samarang, and the Semawong Hospital at Sourabaya, in which at the present moment there are seventeen, eleven, and eleven patients respectively, concerning which no detailed reports are forthcoming."

Extract from the report of Dr. M. Albricht (translated from the Dutch), Sourabaya, Java, November 12th, 1894.

(Leprosy rife in Java.)

Distribution.—Lepers are met with most frequently on the plains.

Heredity.—The Javanese believe leprosy to be hereditary.

Contagion.—The natives of Java consider leprosy to be contagious.

Food.—Fish is held to be a cause of leprosy ; lobster and the roe of several fish are maintained to cause leprous in-

fection. The fish from the island of Madura opposite the town Sourabaya is held to be deleterious.

Segregation.—The moment leprosy declares itself the leper is expelled the town or village. A hut is built for him, and his friends take food to him regularly. The food is carried on a leaf and deposited at the door, and the friend departs quickly in case of infection.

Vaccination.—I cannot bring decisive proof that there is a connection between vaccination and leprosy, but the tendency of belief is in that direction.

Treatment.—Native treatment is unsatisfactory. I am myself (M. Albricht) working at a special form of treatment which will be published next year, the success of which is undoubted. [We have not yet heard of the cure—1897.]

PART II.

LEPROSY IN THE PACIFIC.

LEPROSY IN THE PACIFIC.

But little need be said specially respecting the cause of leprosy in the Pacific, and the apparent immunity of certain groups of islands; as the whole course of this inquiry has evolved itself into bringing out this answer, viz. :—Leprosy is found where Chinese coolies have settled; it is absent where the islands are free from them.

My information is very incomplete, and I would fain have more time and greater opportunities to study this problem, for it raises questions of even more serious import than that of the cure of leprosy. It affects the whole case of Chinese cheap labour; it deals with the possible infection of fresh groups of islands; it means the preservation or destruction of whole races.

Though my information is all too scant, it is not likely that any great centre of leprosy in the Pacific has been missed. Practically there are three homes of leprosy in the Pacific—Hawaii, Fiji, and New Caledonia. At once the thought strikes one, Hawaii is practically American, Fiji is British, New Caledonia is French. Yet the Americans, the British, and the French are not leprous, and cannot have introduced the disease. Leprosy is not indigenous in any part of the Pacific, yet there must be some common factor in the three centres which has determined its presence. That fact—indeed, the only common factor—is the Chinaman, and he *is* leprous.

Fiji has a population made up as follows:

Europeans	3,513
Fijians	114,891
Asiatics, chiefly Chinese .	2,409
Polynesians	5,650
Half-castes	791
Others	190
Total . . .	127,444

Referring to the report on Hawaii, and the suggestion therein made as to the cause of the susceptibility of the Hawaiians to disease, we find a good illustration of the same principle in Fiji, where some years ago 40,000 natives died of measles. We have no information as to when leprosy first appeared in Fiji, but from the fact that it is happily still rare, it cannot have long been there. The danger is there, and the case of Hawaii should be a salutary warning not to neglect rigorous measures to prevent the spread of the disease.

New Caledonia has already its quota of lepers. It is a coral-girt island, of volcanic origin, and inhabited by the same dark race as in Fiji, there being two distinct divisions.

We have no data as to the time when leprosy was introduced, but M. A. Mondiere, writing some ten years ago, does not mention leprosy among the natives. His words are—

"*Maladies.*—Les plus communes sont la scrofule et la phthisie, qui amène le plus de décès: moins cependant qu'à Taiti et à Nouka-Hiva. Du reste, les Européens, qui arrivent en Nouvelle-Calédonie avec la germe de cette dernière affection, voient leur maladie prendre une marche excessivement rapide. Pas des fièvres intermittentes, malgré la presence de nombreux marais. Les maladies de la peau sont très communes, surtout les affections pustuleuses. L'éléphantiasis est assez fréquent et prend, au scrotum, des proportions enormes."

With regard to Hawaii, it is unnecessary to recapitulate what has been said in the special report.

From the New Hebrides we have the report of the Rev. R. M. Fraser, dated Epi, that "we have no cases of leprosy in this island. . . . One island of this group is sometimes called Leper's Island, but I believe it is from a false impression of the discoverer." From personal conversation with the medical officers and naturalists of H.M.S. "Egeria" and "Penguin," I gather that the disease is absent from the Solomon Islands and the Caroline Islands, and I believe also from the Marquesas Islands.

Now, taking only those groups of islands where we are sure there is no leprosy, if we ask whether, in the terms of

the question, they enjoy any "immunity," we can only answer, No. They do not differ in race, climate, geological structure, food, or habits, from islands that are leprous.

But they are free from the Chinese coolie, and this is the reason—and the only reason that can be pointed out—why they have not been tainted.

There seems but one way to prevent the whole of Oceania from becoming leprous, and that is the exclusion or the rigid control of all Chinese coolies. It may not be practicable to exclude the Chinese altogether; but where the very existence of the native races is involved, surely steps should be taken, and that speedily, to ensure that the coolies are not sought for in Kwantung and Fokien, where, alas! they are most easily procured, and where they are almost certain to be tainted. We have the certain case of North Borneo, and the almost equally certain case of Hawaii, together with Fiji and New Caledonia, as bitter warnings. If ever there was a case in which strong Governments should act strongly for the sake of the weak, it is this. A whole ocean is threatened. It has been crossed by leprosy already. Hawaii was the stepping-stone to California, and California is a new and dangerous centre for the distribution of the disease.

Dr. J. L. Meares, Health Officer of San Francisco Board of Health, writing in 1884, says, "We probably have more than 100,000 Mongolians on this coast, and even if the Restriction Act should be efficiently enforced, still you have staring you in the face the fact that leprosy will continue to develop as heretofore among the people."

I write with no class prejudice. I have lived in China for years, and in the most leprous part of it. I know the good qualities of the Chinaman, and respect him in many ways; but when it comes to tainting the world—and this is what it amounts to in the end—one would be wanting in every spark of humanity if one did not speak in the most unmistakable terms upon the danger that is at our doors in the Far East and the Far West.

Hawaii.

The Hawaiian or Sandwich Islands lie in latitude 20° in the North Pacific, and consist of seven large inhabited islands and four rocky islets. The largest, Hawaii, is seventy miles across, and contains 3800 square miles, the entire group being about 7000 square miles in area.

Like all oceanic islands that attain any elevation, they are of volcanic origin, and in Mauna Kea and Mauna Koa we have two of the finest examples of volcanic mountains in the world. The seat of government and the largest population are on the island of Maui, as the larger island of Hawaii is rendered almost sterile and uninhabitable by its three active volcanoes and great sheets of rough lava.

Hawaii is isolated in mid-ocean, being 2350 miles from San Francisco, the nearest part of the American continent, and over 600 miles from the nearest coral islet.

The climate is mild and equable, and must be considered remarkably healthy.

The inhabitants when discovered were of the brown Polynesian type, now classed rather with the Indonesians than the Malay race. At present this population is steadily diminishing, and the fine race seems doomed to extinction. The foreign population consists of Americans and Europeans, with a very large contingent of Chinese and Japanese. The Board of Health expenditure for the year ending March 21st, 1894, was $337,300, the greater part being for the leper establishment—so dreadful is the scourge. No one can study the careful and accurate reports issued by the Government and withhold a meed of pity and a word of admiration, for the oldest European state could not have shown greater zeal, wisdom, and self-sacrifice than this small nation, so recently risen from the savage state.

How fearfully leprosy has seized on Hawaii is shown by the latest report, 1894, which gives the total number of lepers as 1152, made up as follows:

Native Hawaiians	1011
Half-castes	91
Chinese	26
Americans	5
Germans	4
English	3
Irish	1
Portuguese	5
Spanish	2
Canadians	1
Russians	1
Negroes	1
South Sea Islanders	1
	1152

To Dr. C. B. Wood, of Honolulu, and to Dr. R. Oliver, of Molokai, the leper settlement, my thanks are due for full reports, the former adding to my indebtedness by the gift of a complete set of the official reports, containing about 1000 pages of printed facts, every page of which is worthy of study, and has been carefully perused in preparing this report.

It is unnecessary to reiterate the sad history of lepers in Hawaii, or to dwell upon the labours of the noble men and women who have given themselves to the task of alleviating the sufferings of the lepers, and who have in some cases fallen victims to the disease. Nor is this the object of this report, which is to endeavour to elicit facts regarding the origin and spread of leprosy in the Pacific, and the alleged immunity of certain groups of islands.

Briefly, the results of local work tell us that no cure has been found; every scientific man, every empiricist, nay, every quack who has been willing to try his hand in Hawaii has been welcomed, and even paid for by the Government. Some have claimed cures, but in every case it has turned out to be alleviation only, and the patient has at length succumbed to the disease. Alleviation, often marked, and of immense value in mitigating suffering, is all that can be claimed; a cure never. One is almost driven to despair in

studying the long list of failures, but science hopes on, though the lepers are dying.

As to *heredity*, the fact stares us in the face that not one infant is ever born a leper. Some become leprous in after years, but this may be through long-continued intercourse with the leprous.

So with *contagion*; simple contact never seems harmful. Healthy wives and husbands live with their leprous partners for years—some over twenty years—and escape; but the majority succumb at last.

Vaccination, say both the reporters, in the old time when arm-to-arm vaccination was in vogue, "undoubtedly" helped to spread the disease. Neither syphilis nor tuberculosis is considered by my correspondents to have any connection with the disease.

Turning now to the immediate subject, the origin of the disease in these islands. Here we have a group of islands, completely isolated not only from continental lands, but with wide stretches of deep sea, over 2000 fathoms, from the nearest islands. How did leprosy get there? The natives have no name for it, and call it *Mai Pake*, Chinaman's disease—a significant fact, especially as the language is rich in medical terminology. The islands were first discovered by Captain Cook in 1777, but he and others thought they must have been previously visited by the Spaniards. He and the subsequent voyagers carefully describe the skin diseases of the natives, and never hint at leprosy, nor do the early American missionaries. All this evidence is fully set forth at the end of this report, together with a history of the rise and progress of the disease, abstracted from native sources. It was always spoken of at first as a new disease, and not till long after it had taken hold on Hawaii did anyone suggest it had lurked unseen from barbaric times. It is highly improbable that the medical authorities would have overlooked the disease, and the definite records made at the time point to the first uneasiness, followed by alarm and the adoption of vigorous measures for its restraint.

Soon after the discovery of Hawaii the islands became a favourite place of call for the South Sea whalers, and from this time constant intercourse was kept up with the outside world.

Between 1844 and 1846 there was a large influx of Americans into California, then belonging to Mexico, and in 1848 that country was ceded to the United States, and a larger number of immigrants than ever came to the Pacific coast. Trade with the Sandwich Islands sprung up, and has never since flagged. In 1848 came the great discovery of gold in California, and the gold rush is still remembered as a species of madness that affected the whole world. Then we hear of the Chinese; they came to California, and by the year 1856 Hawaii was in constant communication with California, Chili, and China.

Here, then, we have the incentive to the Chinese to visit Hawaii; it was the gold fever of California. By the year 1856 Hawaii was (I quote from contemporary writings) exporting sugar, molasses, coffee, salt, lime, beef, hides, tallow, goatskins, potatoes, and various fruits. Now almost all these things are foreign to Hawaii, and it is a strong proof of the rapidity with which the country was civilised and planted.

If now we turn to the register appended, we shall see that it was exactly at this period when leprosy is said to have appeared; it is 1850 that the Board of Health is established, and nothing said about leprosy; and it is not till 1863 that Dr. Hillebrand reports on "the rapid spread of that new disease, called by the natives Mai Pake." In 1864 it is reported by the President of the Board of Health as spreading to other islands; and from this time on, the story of Hawaii, and of its leper settlement at Molokai, is known to all.

The evidence seems complete. Leprosy was introduced into Hawaii by the Chinese, at, or soon after, the discovery of gold in California.

One other point claims attention. Throughout the whole of this long investigation it has been proved, over and over again, that the Chinese are not only the probable introducers of leprosy, but the chief victims. Here in Hawaii the case is reversed; *yet even here the Chinese form the largest proportion of lepers of other than Hawaiian blood.* Out of fifty lepers of non-Hawaiian blood, not less than twenty-six, or more than half, are Chinese.

This is the one solitary exception over all the great area, stretching over 113° of longitude and 60° of latitude, in which a native race is more leprous than the Chinese. With this exception, all over China, Indo-China, Malaya, the East Indian Archipelago, and the Pacific, it is the Chinaman who is the dominant leper ; the other races either escape, or are but slightly tainted. There is nothing in the climate or physical structure of Hawaii to account for this remarkable fact ; there must be something in the Hawaiian constitution different from that of the Malay, to whom he is allied, though remotely, in blood. We know that isolated communities are very liable to acquire disease from strangers, as in the well-known case of the people of St. Kilda ; and it is this which makes measles such a scourge in uncivilised places like Fiji. Now the Hawaiians were among the most isolated people in the world, and until a century ago never saw a creature except of their own race. They were quite suddenly brought within the influence of a higher civilisation, which they adopted with great heartiness and success. They also received into their midst a greater number of Chinese than any other place in the Pacific ; and they are being swept off the face of the globe by the ravages of the fell disease the Chinese brought with them. This affords a rational and apparently sufficient explanation of all the anomalous facts respecting leprosy in Hawaii.

The very full and accurate reports (amounting to 992 pages of letterpress) published by the Hawaiian authorities, and the impartiality with which both friendly and adverse criticisms are recorded, enable us to trace the history and the growth of opinion concerning the spread of leprosy in these charming islands. The list of publications and the names of authorities having already been given in full, it is deemed unnecessary to burden the text with a multitude of cross references. Every report has been carefully sifted, and all facts and opinions of value have been noted.

Source and spread of the disease.—Considerable interest attaches to the question whether leprosy was introduced into these islands by Chinese, or whether it existed when the early navigators first visited the land. The evidence which is not cited in the Hawaiian reports has been col-

lected from contemporary travels and reports, and is as follows :

1777. Captain Cook discovers or rediscovers the group to which he gave the name of Sandwich Islands.

1779. Captain Cook again visits the islands, and, losing his life, the narrative is taken up by Captain King. The former, knowing some of his men to be suffering from venereal disease, gives stringent but ineffectual orders to prevent its introduction among the natives. Captain King afterwards states that "as there was not the slightest appearance of that disorder amongst them on our first arrival, I am afraid it is not to be denied that we were the authors of this irreparable mischief." Speaking of Mowhee (Maui), he says, "We found them to be of the same nation with the inhabitants of the islands more to leeward, which we had already visited, and if we did not mistake them, they knew of our having been there ; indeed, it appeared too evident, for these people had contracted the venereal disease, and as yet I knew not any other way of its reaching them but by an intercourse with their neighbours since our leaving them." He describes a priest as a "little old man, of an emaciated figure, his eyes exceedingly sore and red, and his body covered with a white leprous scurf, the effect of an immoderate use of ava." Again he says, "They are, in general, very subject to boils and ulcers, which are attributed to the great quantity of salt they eat with their flesh and fish. The erees (chiefs) are very free from these complaints ; but many of them suffer still more dreadful effects from the immoderate use of the ava. Those who are most affected by it had their bodies covered with a white scurf, their eyes red and inflamed, their limbs emaciated, the whole frame trembling and paralytic, accompanied with a disability to raise the head. . . . The young son of Terreeoboo, who was about twelve years old, used to boast of his being admitted to drink ava, and showed us with great triumph a small spot in his side that was growing scaly." The population of the islands was estimated at 400,000, and he says, "I am pretty confident that in this calculation I have not exceeded the truth in the total amount."

1786. The ill-fated La Perouse, writing of venereal disease in the islands, says, "Their features have no delicacy, and their dress discovered to me, among much the greater number, traces of the ravages committed by the venereal disease. As there were no women came to the ships in the canoes, I thought that they attributed to the Europeans those evils of which they bore the marks; but I soon perceived that this remembrance, supposing it real, had not left on their minds any kind of resentment." He then gives his reasons for doubting the European origin of this disease: his surgeon-major, a very enlightened man, treated several of the sufferers, whose disease he considered, judging from his experience in Europe, was from twelve to fifteen years old; he also saw children of seven or eight years of age labouring under it, who could only have been infected while yet in their mothers' wombs. He then cites Captain King's account of Maui, quoted above, which he thinks tells against the probability of the disease having been communicated sixty miles to leeward in so short a time.

In the same year Captain Pollock visited the islands, and describes the same priest as suffering from a leprous scurf, due to drinking ava.

1792. The celebrated Captain Vancouver is the next who describes the islands, and after quoting from Captain King, goes on to speak of the sad increase of immorality among the natives due to European intercourse. He also describes the white sealy disease due to ava drinking. By this time the natives had acquired firearms from unscrupulous European and American traders, the result being a marked and appalling diminution of the population.

1823. The story is now taken up by the missionaries of the American Board. In this year the Rev. C. S. Stewart landed in the islands, and kept almost a daily record of events. From these Dr. A. Mouritz, of Molokai, quotes, and they are the earliest references in the Hawaiian Reports. The extracts are as follows:

"Nor to mention the frequent and hideous mark of a scourge, which more clearly than any other proclaims the curse of a God of purity, and which while it annually consigns hundreds of this people to the tomb, converts

thousands while living into walking sepulchres. The inhabitants generally are subject to many disorders of the skin. The majority are more or less disfigured by eruptions and sores, and many are unsightly as *lepers*. The number of either sex, or of any age, who are free from blemishes of this kind is very small, so much so that a smooth and unbroken skin is far more uncommon here than the reverse is at home."

Again, "We seldom walk out without meeting many whose appearance of misery and disease is appalling, and some so remediless and disgusting that we are compelled to close our eyes against a sight that fills us with horror. Cases of ophthalmia, scrofula, and *elephantiasis* are very common."

These quotations, in the opinion of Dr. Mouritz, prove that true leprosy was then prevalent in the islands—an opinion in which probably few will follow him, as it is diametrically opposed to the subsequent history of the disease.

1840. Dr. Mouritz mentions a "Mr. Brickwood, a resident on these islands in the year 1840, who recognised the disease of a certain native in Honolulu to be leprosy. This gentleman had a previous knowledge of the disease in another country where it prevails, viz. Egypt."

1848. Leprosy said to have been introduced by the Chinese.

1850. The Board of Health organised, December 13th, King Kamehameha III. It authorises "everything that ought to be done or undone, removed or procured, for the preservation and cure of contagious, epidemic, and other diseases, and more especially of cholera." It does not mention leprosy by name, which it surely would have done had the disease been prevalent, as Dr. Mouritz argued it was from the American missionaries' reports in 1823.

1853. Dr. Mouritz quotes Dr. Hillebrand as having seen the first Hawaiian leper at this date.

1857. Mr. R. M. Meyer, the Board's agent at the leper settlement, Molokai, writing in 1886, states that he first heard of leprosy in this year.

1859. In the same report Mr. Meyer states that he saw the first case of leprosy "on this island" (? Maui) in 1859

or 1860. The patient was a young man who succumbed in less than three years. He further states that in 1850 very little, if anything, was heard of the disease, which he thinks was introduced by the mixed crews of the whale-ships, "which had negroes, black and white Portuguese, and men of other races, coming from countries where leprosy was, and still is, prevalent."

1863. In April Dr. Hillebrand, surgeon to the Queen's Hospital, reports on "the rapid spread of that new disease, called by the natives *Mai Pake*," *i. e.* Chinese disease.

In December the Board of Health discussed "Mai Pake as threatening to become more general."

1864. In February the President of the Board of Health learns that the disease is spreading at other islands. A leper census is ordered.

In May a letter to the 'Pacific Coast Advertiser,' dated Kona, Hawaii, May 12th, 1864, states that whereas "one year ago there was but one case of Mai Pake in the district, ... now within a distance of five miles from that house cases of this incurable disease may be counted by the dozen."

In August Dr. Hillebrand reports the disease as spreading, and recommends isolation as the only remedy.

1865. In January an "Act to prevent the Spread of Leprosy" was passed. Its preamble states that "whereas the disease of leprosy has spread to a considerable extent among the people," &c. It authorises the setting apart of Government lands for establishments for the isolation of lepers.

In February Dr. D. Baldwin, of Lahina, states that the disease is yet "only a mild form of leprosy," but fears it will assume "terrible features." "We are," he remarks, "beginning to have a crop of leprous young children."

In April $15,000 was appropriated especially for a hospital, &c., for lepers.

In July the *makai* (seaward) lot of Kalihi was purchased, and a leper hospital started.

In September Kalaupapa, on the island of Molokai, was purchased for a leper settlement.

1874. The President of the Board of Health, Mr. H. A Widerman, says, "Seclusion—and strict seclusion—has to

be maintained *if you want to save the balance of the Hawaiian race.*"

1873. The Hawaiian Evangelical Association fears "our Hawaiian people will become a nation of lepers."

1882. The President of the Board of Health, Mr. W. N. Armstrong, says, "There are probably 2000 lepers in the kingdom, or 5 per cent. of the whole native races."

Dr. G. L. Fitch, medical superintendent of the Kakaako Hospital, estimates the number of lepers at 1600. He states that during the last forty years or so, less than twenty cases have occurred among the whites.

1884. The President of the Board of Health, Mr. M. Gibson, estimates the number of lepers as at least 2 per cent. of the entire population.

1892. Dr. Arning, an expert who had spent two years in the islands studying the disease, writes from Europe, "Hawaii is decidedly not as recent a centre of leprosy as was accepted in 1883."

1894. The executive officer of the Board of Health, Mr. C. B. Reynolds, reports, "The gathering in of the lepers from Kalalau and Wainiha valleys, also from Niihau and Lanai, places that have been undisturbed strongholds of lepers for many years, has added over 60 to the number of those sent to Molokai this period, the total of which is 340, as against 333 for the period (two years) ending 1892, and 798 for the period ending 1890. These figures go to prove that impartial and thorough segregation will eventually rid the islands of this disease. He gives the following table :

	No. of Lepers.
April 1st, 1886, to March 31st, 1887	612·7
,, 1887 ,, 1888	618·8
,, 1888 ,, 1889	921
,, 1889 ,, 1890	1150
,, 1890 ,, 1891	1168
,, 1891 ,, 1892	1137
,, 1892 ,, 1893	1105
,, 1893 ,, 1894	1140·2

List of Hawaiian Authorities.

1876. 'Report of the Board of Health to the Legislative Assembly of 1876.' Honolulu, 1876, pp. 10.

1878. 'Biennial Report of the Board of Health to the Legislative Assembly of 1878.' Honolulu, 1878, pp. 13.

1885. 'Dedication of the Kapiolani Home for Girls, the Offspring of Leper Parents, at Kakaako, Oahu, by Their Majesties King Kalakaua and Queen Kapiolani. Description of the Leper Settlement on the Island of Molokai.' Honolulu, 1885, pp. 42.

1886. 'Leprosy in Hawaii. Extracts from Reports of Presidents of the Board of Health, Government Physicians, and others, and from Official Records, in Regard to Leprosy before and after the Passage of the "Act to prevent the Spread of Leprosy," approved January 3rd, 1865. The Laws and Regulations in Regard to Leprosy in the Hawaiian Kingdom.' Honolulu, 1886, by authority, pp. 192.

1886. 'Appendix to the Report on Leprosy of the President of the Board of Health to the Legislative Assembly of 1886.' Honolulu, 1886, pp. 156.

1886. 'Leprosy in Foreign Countries: Summary of Reports furnished by Foreign Governments to His Hawaiian Majesty's Authorities, as to the Prevalence of Leprosy in India and other Countries, and the Measures adopted for the Social and Medical Treatment of Persons afflicted with the Disease.' Honolulu, 1886, pp. 247.

1890. 'Biennial Report of the President of the Board of Health to the Legislature of the Hawaiian Kingdom, Session of 1890.' Honolulu, 1890, pp. 143.

1892. 'Biennial Report of the President of the Board of Health to the Legislature of the Hawaiian Kingdom, Session of 1892.' Honolulu, 1892, pp. 125.

1894. 'Report of the President of the Board of Health to the President and Members of the Executive and Advisory Councils, 1894.' Honolulu, 1894, pp. 64.

Total number of pages in the Official Reports, 992.

Honolulu.

Letter from C. B. Wood, M.D., Honolulu.

Physical features.—Given above.

Distribution.—There are no plains; the natives, except those living in the cities, live generally in the valleys; no special effect of elevation has ever been noted. The same is true of moisture or dryness.

Heredity.—The natives believe the disease to be hereditary to some extent, but it is a belief which they have gathered from the whites.

Contagion.—The natives believe leprosy to be contagious, but they have no fear of it. Lepers among them are not shunned, but on the contrary are harboured and hidden away by them to prevent their discovery and arrest (for segregation) by the Board of Health. They will fearlessly expose themselves to contagion by eating and sleeping, and smoking the same pipe with a leper relative or friend.

Leprosy is considered contagious by the physicians and the public generally.

Food.—Raw fish has been assigned by some as a cause, but is not generally credited. The natives are very fond of raw fish, and eat it constantly.

Segregation.—An almost inaccessible piece of land has been assigned by the Government on the north shore of the island of Molokai. This is set apart for a leper settlement. All persons suspected of leprosy are required to report at Kalibi, near Honolulu, on certain days for examination by a Board of five medical men. If pronounced lepers they are sent to Molokai; if suspected merely they are given their liberty, but are required to report themselves once a month to the Board of Health.

Tuberculosis, syphilis, and malaria.—There is no connection between leprosy and any of these. Any two or three may exist in the same person. It is not at all uncommon for leprosy and syphilis to co-exist. Tuberculosis is not very prevalent in this country.

Vaccination.—A number of years ago, when arm-to-arm

vaccination was practised, it undoubtedly helped to spread leprosy. All vaccine now used is imported, hermetically sealed.

Treatment.—Ichthyol, salol, salicylate of soda, creasote, and arsenic internally. Ichthyol, chrysophanic acid, pyrogallic acid, and hot sulphuret of potash baths externally. There is no native drug of any value. The natives consider Awa-root (Kawa-kawa) beneficial, but without warrant.

Extracts from report of Richard Oliver, M.R.C.S., Molokai, Hawaiian Islands.

"Anything I might say in answer to the physical features and distribution of leprosy in these islands would be of no value to you. This settlement is merely the place of abode of lepers gathered from all parts of Hawaii."

Heredity.—The natives believe in the hereditary transmission of leprosy.

Contagion.—The natives consider leprosy to be contagious.

Food.—No kind of fish or other food is assigned as a cause of the disease by lepers here.

Segregation.—A portion of Molokai, one of the islands of the Hawaiian group, containing about 6000 acres, is set apart for lepers from all parts. Segregation is strictly observed, and is regulated by the Board of Health and the police.

Tuberculosis, syphilis, and malaria seem in no way connected with leprosy.

Vaccination.—In years gone by vaccination undoubtedly caused increase of leprosy, owing to the lymph being obtained indiscriminately and carelessly.

Treatment.—The natives have no drugs of any repute. At various times, and for lengthened periods, all drugs of any repute whatsoever in the treatment of leprosy have been tried in Molokai.

Creasote in large doses has been of decided benefit when it has been persevered in for months or years.

Hoan-Nan in the anæsthetic form of leprosy is valuable in relieving symptoms.

For general treatment, nothing has equalled the use of the hot-water bath daily. Profuse sweating produced by medicating the water with sulphuretted potash and other drugs seems to be the cause of the noted improvement. At the same time attention has to be paid to the food and general condition of the patient. Tonics, arsenic, Hoan Nan, creasote, with regular bathing, have in mild cases effected an apparent cure. In the more advanced cases this hot-water treatment is also of service ; but in all cases when it has been dropped, sooner or later the disease manifests itself.

The Japanese secret treatment is really nothing more than hot-water bathing with arsenic, iron, &c. With the Japanese, however, the bathing is pushed to extremes, the patients become anæmic and actually blue, and then, when they commence to fail, do so rapidly. Bathing in moderation, with the above-mentioned medicinal treatment, is the only method known by which the disease can be arrested.

Fiji.

(Leprosy prevalent.)

The Fiji group contains about a hundred islands, nearly all lofty and fertile, and, like all high Oceanic islands, are of volcanic origin.

Two communications have reached me from this distant Summer Isle of Eden, and these just before the last mail goes to Europe. Distances are so immense, and posts so few and far between, that I owe an especial debt to Drs. Barnes and Pound for answering so promptly. The former writes from the small island of Ovalau ; but as he mentions lepers coming to the hospital at Suva, I infer that this scourge has spread over the more populous islands. Happily he reports, "It is very rare in this island."

Segregation is seldom enforced, and there are no native specifics, and these facts point to the disease being an imported one. Indeed, it must have been, for there is not a particle of proof that the disease was known in the Pacific islands till well into the present century.

The connection between Fiji and China began early, for

this has been a favourite source of sandal-wood ; then came planting, and its concomitant diseases ; and though my evidence is too scanty to prove it, there is nothing against the suggestion that to China these beautiful isles are indebted for this blight.

Fiji is interesting as being the western limit of the Papuan or black race. They are a fine people, capable of high culture.

For other details see report on leprosy in the Pacific.

Report by Dr. J. M. Barnes, Leveika, Ovalau, Fiji, October, 1894.

(Leprosy rare.)

Physical features.—My district is a very small island (Ovalau), twelve by eight miles, rocky and mountainous (up to 2000 feet) ; soil poor and almost entirely cultivated by natives, and sparsely populated. Rainfall 140 inches per annum. The natives live in small villages scattered round the island shores, with one village in the valley in the interior.

Distribution.—No hill dwellers except in the village referred to.

Heredity is believed in.

Contagion.—The natives believe leprosy is contagious.

Food.—As far as I am aware, the natives find no connection between the diet and leprosy.

Segregation.—Not usually enforced by the natives, but when it is the leper is compelled to live on the very outskirts of the village, and not allowed to mingle with the community ; he is given a wide berth.

Tuberculosis, syphilis and malaria.—No connection observed.

Vaccination.—No connection between vaccination and leprosy observed.

Treatment.—No lepers come to me for treatment. Some are occasionally treated in the Suva (another island) Colonial Hospital. I know of no reputed native drugs.

Report by J. F. Pound, Esq., M.R.C.S., &c., Colonial Surgeon, Suva, Fiji, October 23rd, 1894.

Distribution.—Leprosy appears to be more common inland.

Heredity.—The natives believe leprosy to be hereditary.

Contagion.—The disease is held by the natives to be contagious.

Food.—No kind of food is considered to predispose to leprosy.

Segregation is practised in some districts, but neglected in others. Generally a native house is built for the leper just outside his village.

Tuberculosis and leprosy seemed to be in some way connected.

Vaccination.—I know of no evidence I could advance one way or the other.

Treatment.—The natives have a drug [not named] which they employ largely, but it seems powerless; all cases treated by natives going rapidly to the bad.

Extract from letter of Sir William des Vœux, G.C.M.G., formerly Governor of Fiji.

(Leprosy prevalent.)

Leprosy is undoubtedly very common in Fiji. One or two of the high chiefs died of it in my time.

There is no malaria in the smaller islands, or at least in many of them, but in the largest—Viti Levu—malaria is fairly common near the debouchure of the rivers; the evil is, however, trifling in comparison with most other tropical countries. In my time there were no Chinese coolies.

Fiji is the border-land between the light and dark coloured Polynesian races, the former probably of Malay, the latter of negro origin.

Borneo.

Report by S. B. J. Skertchly.

(Leprosy met with; confined almost exclusively to Chinese; when Chinese leave a district leprosy disappears.)

Borneo, the largest island in the world if we except Australia, is about 300,000 square miles in area, or three times the area of the United Kingdom, and it has a population of about 2,500,000. It is gathered round a mountain system, which culminates in the grand mountain of Kinabalu in North Borneo, from which long ranges are sent off like the fingers of the hand. These fingers stretch all over British North Borneo, save where they are broken by the many rivers; and the forefinger points south and reaches to near the coast, but leaving a wide stretch of lowlands between its tip and the sea. Other fingers point east and west; but no map the writer has seen conveys any adequate idea of the general aspect of the land. It must suffice us here to say that the greater part is under 500 feet of elevation, and that the lowlands are chiefly in the south.

Its geology is simple. Granite forms the core of North Borneo, but occupies little area. Then come schists of Archæan age, which occupies much of the interior; and over these lie a series of sandstones and limestones, with coal-seams, the oldest of which are probably of Oolitic, the newest certainly of Tertiary age.

The rivers are numerous, and many can be navigated by launches for several hundred miles. Borneo is in fact a small continent rather than a large island. It is practically one vast primeval forest, and the population is sparse.

The true natives may be classed under two headings, Dyaks and Buludupies. The Dyaks are generally classed as a branch of the Malay stock, but long and intimate intercourse with them has forced the writer to consider them as belonging to the Indonesians. The Buludupies of North Borneo are as certainly neither of Dyak nor Malay origin. They belong possibly to that curious relic of the

Caucasian race which has left another outlier in Cambodia, though I have not ventured to colour them so on the map. The Malays are not indigenos, and only occupy the littoral. Chinese, Klings from the Madras coast, Arabs, and Somalis are found, and save the first are few in number. The Chinese reached Borneo in the thirteenth century, and have left their impress on the people of the west coast of the island.

Owing to Dr. J. Walker, the principal medical officer of British North Borneo, having left the country, and to changes in the medical staff generally, no direct replies were received from this part of Borneo, but Mr. S. B. J. Skertchly and Mr. E. F. Skertchley, who have spent several years and travelled much in the country, have given me the following notes, but wish me to state that they did not have their attention specially directed to the subject while there. From other parts of Borneo no replies have yet come to hand, but the official report of the Netherlands authorities to the Hawaiian Government affords some useful information.

The years in which the Messrs. Skertchly were connected with Borneo were from 1888 to 1893 inclusive. In 1888 there were no lepers in North Borneo, but several cases among Chinese occurred within two or three years, when a great number of coolies from Kwantung and Fokien were brought into the country for the newly-opened tobacco estates. They came in hundreds by every ship, and soon a large contingent was shipped from Singapore, and latterly a number of Javanese from the tobacco estates of Sumatra.

In 1890 the first case of leprosy was noticed, and in this year the Government set apart an old kajang (palm-mat) hospital or shed for the reception of lepers on the island of Bahalla, near Sandakan. There were never more than ten inmates, and they have since been deported from the land. All of them were Chinese, and all from South China.

The only case of leprosy other than Chinese was that of a Portuguese about twenty-five years of age. He was a convict, and was believed to be syphilitic, but the disease proved to be leprosy. He was kept in a separate room in the jail, and when well enough to move about was not in

the least shunned by the other prisoners, who were Chinese, Malays, Philippine Islanders, and occasionally a European. He suffered from the tubercular form of the disease, and was the only case of the sort. He was still alive when my informants left Borneo.

The Chinese lepers on the island of Bahalla had the "dry" anæsthetic form of leprosy. They were provided with rice, salt, and so on by the Government, supplies being taken over to them once a month. They seemed quite happy, and were comparatively well off; for they made quite a good garden, and grew as many vegetables as they wanted. Their crops were water-melons, sweet potatoes, French beans, ochra, tapioca, and a little sugar-cane. The Government gave them tobacco and other little luxuries. A *kelung* or fish-trap was built for them, and afforded an ample supply of fish.

The station was quite isolated, being a little plain cut off from the rest of the island by impassable cliffs, and they were not allowed a boat.

A Chinese dresser, attached to the coolie barracoons on the same islands, paid very frequent visits, as did the principal medical officer, Dr. Walker; and Mr. E. F. Skertchly was very often there, and reported on their condition to the doctor.

He noticed that the lepers at work in the garden were anæsthetic in the fingers, which were crumbling away like white dust, and he has seen quite large patches detached and adhering to the *chungkols* or hoes, without the leper being conscious that he was crumbling away. They were quite happy, and not at all jubilant when in 1893 the edict went forth for their deportation.

Messrs. Skertchly were in constant connection with all classes of natives, both in the towns and far up into the interior, and never saw or heard of a native leper, though pityriasis and ringworm are very common diseases. North Borneo may be certainly pronounced free of leprosy, but this may not long be the case.

When the lepers were deported the country was in a state of stagnation, most of the estates had been shut up, and the greater part of the coolies had been sent back to their homes.

The Bajows, a roving tribe known as sea gipsies, came down from their haunt at Nunoyan Laut, and carried off the kajangs and floor planks of the hospital. This shows that they had no fear of contagion, and it will be curious to notice whether they acquire leprosy. Nunoyan Laut is a low sandy island, about a mile and a half from the mainland, from which it is separated by shallow water, and it is about five miles from Bahalla. The Bajows are quite isolated, living entirely by fishing and holding hardly any communication with the towns or even the other natives, and practically none whatever with the Chinese. If, therefore, these people should develop leprosy, it will be one of the finest examples of contagion. Hence it is as well to record the facts.

None of these lepers had any idea of any connection between leprosy and vaccination; and though the natives of Borneo now fully appreciate the value of vaccination, and will even travel miles to be vaccinated, Mr. Skertchly never heard a hint that they feared it might put the stamp of leprosy upon them. It should be stated that this gentleman never put the direct question to the natives; he had not had his attention specially directed to leprosy at the time; but he has often had long talks with the natives, and has especially inquired whether they ever observed any ill effects from vaccination. The answer has invariably been in the negative. The natives are very frightened of smallpox, which some years ago depopulated whole districts.

Mr. Skertchly tells me both the Dyaks and Malays are clean people, much more so than the peasantry of the west of Ireland, and that he has often, in the jungle, slept under the same mat with them, but that he would have to be in desperate straits before he would do so with a Chinaman.

A very strong proof that leprosy is not endemic in North Borneo is the fact that they have no native word for it. The Malays speak a dialect of Malay slightly differing from that of the Straits, and they certainly have no word for the disease, and always described it by the simple word *sakit*, sickness, with the expressive pantomime of slowly blowing the nose into the hand. Educated Malays of course knew

the word *kosta*, but were so unaccustomed to its use, and so identified the disease as a stranger, that they generally called it by the English name leprosy. A stronger proof of the foreign origin of leprosy could not be desired.

The official replies respecting leprosy in the Netherlands East Indies give some useful information, but it is noticeable that although so much of Borneo is under Dutch rule, leprosy is not mentioned as occurring there. Had it been even as common as in Java, where it is reported as rare, it is unlikely that it would have been passed over.

The result of this inquiry is only definite as regards North Borneo, where we know leprosy was unknown to the natives, and where it was introduced about 1888 by Chinese from South China.

In South Borneo the same is probably the case, but this can only be inferred from the omission of any notice of the disease in Dutch Borneo in three separate official reports, drawn up for the purpose of demonstrating the extent and character of the disease.

Borneo is, however, being affected, and as we know the source of the infection, it might be well for the planters to take steps to try and obtain their coolies from the untainted north of China.

For notes as to the thirteenth century incursion of Chinese to North Borneo, see Mr. Skertchly's 'Report on the Physical Conditions under which Leprosy occurs.'

Philippine Islands.

(Leprosy endemic.)

Physical features.—A group of large islands bounding the eastern side of the China Sea, and extending between 4° 40′ N. latitude and 20″ N. latitude, and together comprising an area about the size of the British Isles.

The geology and fauna have been but little studied, owing to the want of scientific investigation. The Spaniards, although they have occupied the country for well-nigh 300

years, have done little or nothing in the matter. Gneiss, chlorite slate, Eocene limestone, conglomerate sandstone, and modern volcanic rocks are met with in various parts. Mountainous ranges characterise every island, and the narrow valleys intervening afford passage to plentiful streams.

The islands are tropical throughout; the winter months are cool, the spring and summer hot, and the autumn rainy. The aborigines, now few in number, are Negritoes; they were driven inland by a Malay people who now form the main native population of the islands.

Chinese immigrants form a large section of the population in the town of Manila; alone they number well-nigh 40,000.

Letters from Dr. Donelan and Father Evaristo Forres, both dated from Manila.

(Leprosy prevalent.)

No European is reported to have contracted leprosy in the Philippines.

There is one hospital near Manila, "Hospital de San Lazaro," which was erected in the year 1577, and rebuilt in the year 1774. The hospital consists of 180 beds devoted exclusively to the treatment of lepers.

Dr. Donelan at one time collected a good deal of information on the subject of leprosy, but the record has not been published.

There seems no doubt, from the large size of the hospital accommodation, that leprosy is prevalent in and around Manila. It will be observed that here the Chinese are in enormous numbers; the chief recruiting ground, moreover, being the leprous Chinese provinces of Kwantung and Fokien.

New Guinea.

Letter from Sir William McGregor, K.C.M.G., M.D., Lt.-Governor British New Guinea, dated from Government House, Port Moresby, June 16th, 1895.

(Leprosy is met with; syphilis unknown; vaccination not introduced; no native word for the disease.)

New Guinea, a continental island to the north of Australia, lies between latitude 0° 5′ to 11° 5′ S. Practically all possible physical and geological features obtain,—swampy, hilly, and alluvial lands; land on limestone, lava, sandstone, slate, basalt, granite, &c.

Mountains rise to a height of 13,000 feet. The racial tribes are of the Melancsian (Papuan) type—"Oriental negroes."

Distribution.—Leprosy occurs sporadically anywhere.

Heredity.—The natives do not believe in heredity; they attach so little importance to the subject of leprosy, that in twenty-seven known dialects there is no specific name for the disease. Leprosy is known as a "sore."

Contagion.—Natives do not believe leprosy to be contagious.

Food.—No food is assigned as a cause of leprosy, unless sometimes "il mal oechio." Fish used largely.

Segregation.—Not in use.

Allied diseases.—*Tuberculosis* almost unknown. *Syphilis* unknown. *Malaria* is unknown in Fiji, but there is plenty of leprosy there.

Vaccination.—Not yet introduced.

Treatment.—No native Papuan remedy is in use. The roasting cure of Fiji is unknown here.

A note on the diseases of New Guinea in the 'Encyclopædia Britannica' reads as follows:—"The chief diseases are skin diseases, with which in some places one third of the population is affected,—amongst these a sort of leprosy, to which, as well as to a dropsy (beri-beri), Europeans are subject; catarrhs, boils, syphilis," &c. This may be called a scientifically loose statement. There are no "sorts of

leprosy ; " leprosy is a distinct disease. Sir William McGregor declares syphilis to be unknown, but this report includes syphilis in its list of diseases.

Extract from letter of Mr. H. M. Dauncey, Delena, New Guinea.

(Leprosy almost unknown. No native name for the disease.)

"I would answer your questions concerning leprosy if I could, but I am sorry to say I cannot for several reasons. Amongst them these :—though I have heard of a few (very few) cases in New Guinea, I have never seen a case of leprosy as far as I know. I do not think the natives know leprosy as distinct from sores, &c., for our senior missionary, the Rev. W. G. Lawes, has had to use an adaptation of the English word in translating the New Testament."

New Britain.

(No leprosy.)

Report by Rev. William Brown, Wesleyan Missionary.

New Britain, an island some 340 miles by 23, is one of the Polynesian group. Separated by a channel 20 miles wide lies an island of almost the same extent—New Ireland, and in this channel lie the Duke of York group from whence Mr. Brown dates his letter. They lie in a horseshoe-shaped group some 50 miles eastward from New Guinea, and between the fourth and sixth parallels of 4 S. and 6 S. lat. The islands are studded with active volcanoes on a very grand scale ; the vegetation is luxuriant and varied. The inhabitants belong to the Papuan section of the Melanesian race.

"Port Hunter, Duke of York,
"New Britain,
"*Sept.* 1*st*, 1894.

"Dear Sir,—I should be very pleased to answer your questions concerning leprosy, but as far as I know there are no cases of leprosy in this district. There are many

persons affected with scrofulous sores, which we missionaries have tried in vain to cure, but they are not leprous. Vaccination has never been introduced amongst the natives. I have never heard of any disease among them in this archipelago that might be looked upon as leprosy.—Yours faithfully, WILLIAM BROWN.

"No leprosy in this group of islands. Vaccination not practised."

NEW HEBRIDES.

(No leprosy.)

Report of Mr. OSCAR MICHELSON, dated October 22nd, 1894, Mission Station, Tongoa, New Hebrides.

"The reply to your question is short, viz. 'I do not believe there exists leprosy in the New Hebrides.' Of course it would be an interesting inquiry to try to find out in what way these lands differ from other countries, and by such means perhaps the cause of leprosy might be discovered; but that, I suppose, is not what you want at present. There is an island in this group called 'Lepers' Island,' but that I believe is founded on a mistake. Perhaps an unusual number of the people there may have had scrofulous sores, which have been mistaken for leprosy."

Physical features.—The New Hebrides extend for a distance of 700 miles in latitude 9° 45′ S., and 20° 16′ S., having the Solomon Isles some 200 miles to the north-west, and at a similar distance New Caledonia to the south-west. The whole group is volcanic, and the surface covered by dense woods and tropical vegetation. The inhabitants are of the Melanesian race, but Polynesian tribes are met with.

Mr. Michelson's report is very complete—"There is no leprosy." The reference to a "Lepers' Island" may not, however, bear the interpretation he puts upon it. There may have been no mistake in the name at one time, but as in the Friendly Islands leprosy has decreased, so it is possible that it has decreased and finally disappeared here. There has been no influx of immigrants to the New

Hebrides during recent times, and it may have been owing to this that they have escaped contamination.

Report of the Rev. R. M. Fraser, July 23rd, 1894, Api, New Hebrides.

"We have no cases of leprosy in this island. One of this group is sometimes called Leper Isle, but I believe it is from a false impression of the discoverer."

Friendly Islands.

(Leprosy disappearing.)

Report by H.B.M. Vice-Consul, Tonga, October 17th, 1894.

"I enclose my answers. There can be no doubt that the disease is not nearly so prevalent or so serious as it used to be when the population of these islands was much greater than it is now. I have not, for instance, seen a "bad" case since my advent nearly eight years ago.

Physical features.—The Friendly or Tonga group of islands lie in the South Pacific, extending from 18° 5′ S. to 22° 29′ S. latitude, to the eastward of the Fiji group. A Polynesian people inhabit them, distinguished by being the most advanced of that race in social order and intellectual power.

The geological formation is that of a coral limestone covered by a rich mould. Volcanic eruptions are frequent. The climate is enervating, owing to the dampness of the air and the plentiful and luxuriant vegetation.

Distribution.—No natives live more than about 300 feet above sea level.

Heredity.—According to the native idea leprosy is hereditary, running in families, more especially when the mother has been afflicted.

Contagion.—Leprosy is not held to be contagious; in former days leprous women married and had children. Some seventy years ago there was more leprosy than now, but then the population was three times what it is now.

Most of the children born of leprous parents died in infancy.

Food.—No food is accredited with being a cause of leprosy.

Segregation.—Until quite recently no legislation existed, but a law has within the last few years been passed commanding segregation, but it is not strictly observed or enforced.

Tuberculosis, syphilis, and malaria.—No connection has been observed between leprosy and any of these.

Vaccination.—Vaccination was practised in a portion only of two groups of islands some twenty years ago, but no increased prevalence of leprosy has been noticed in consequence.

Treatment.—No treatment is exercised with a view to cure, except cauterising the sores. The natives prescribe certain vegetable drugs.

Samoa.

(Leprosy introduced by Chinese ; not endemic ; not spreading.)

Letter from Dr. F. H. Davies, of the London Mission, dated from Tuarisi, Sawaii, Samoa, October 30th, 1894.

Samoa is the native name for a group of volcanic islands in the South Pacific Ocean, lying between latitude 13° 31′ and 14° 20′ S.

Sawaii is the most extensive, with mountains rising to the height of 4000 feet. Climate warm and humid, average for the year 80° F. The inhabitants dwell on the sea-shore.

Food consists of fish, taro, bread-fruit; but yams are the principal foods, with half-cooked pig and fowls for delicacies.

Diseases.—Elephantiasis and strumous diseases exceedingly common. I get scores of ulcers of the strumous œdematous type to treat. I have had fifty during the last five months. Some patients have two or three such ulcers. With a basis of iodide of potassium and a dressing of calomel, &c., I find they get well.

Leprosy.—I mentioned in my paper read at the Intercolonial Medical Congress held at Sydney, September, 1892, that we had in Samoa two cases of leprosy, both Chinese, and a suspected case in the person of an Hawaiian (Sandwich) Islander. One of the Chinamen died three years ago, the other was deported.

From evidence collected for an African-English resident, it would seem that at the present moment, in addition to the Hawaiian mentioned above, two half-caste Samoans and one pure Samoan are believed to have leprosy. I (Dr. Davies) have never seen a case of leprosy amongst my numerous patients.

Few, very few Chinamen are in Samoa, perhaps half a dozen at most. I do not think leprosy has ever been endemic in Samoa.

Extract from letter of H.M. Consul, T. B. C. Smith, Samoa, October 20th, 1894.

"The only two cases of leprosy (suspected) during the five years of my residence in Samoa occurred in the persons of Hawaiians, but the cases were both doubtful."

PART III.

ON THE PHYSICAL AND ETHNOLOGICAL CONDITIONS UNDER WHICH LEPROSY OCCURS IN CHINA, THE EAST INDIAN ARCHIPELAGO, AND OCEANIA.

Prepared for Mr. Cantlie's Report on Leprosy

By SYDNEY B. J. SKERTCHLY, F.G.S., F.A.I.;

late of H.M. Geological Survey.

The information embodied in this sketch has been derived from reading, from the study of the numerous reports sent to Mr. Cantlie, and from personal observation during eight years of residence and travel extending from the north of China to the south, to Borneo, Sulu, Celebes, the Moluccas, and the Philippines.

The scheme may be divided into three branches:—(1) Climatological; (2) Geological; and (3) Ethnological.

1. *Climatological.*

The vast area treated of in this report includes every type of climate except the arctic. It embraces temperate climate, as in Korea, Manchuria, and Japan; tropical, as in South China; and equatorial, as in Borneo and Java. It illustrates the extremes of continental climates, with burning summers and bitterly cold winters, as in North China, as well as typical insular climates, with an equable tempera-

ture all the year round, as in the Pacific islands. It includes every variety of humidity, from parched lands of semi-desert character, as in much of North China, to steaming jungle hotbeds, as in Borneo and the Malay States. The winds that are encountered vary from the zephyrs of the equatorial belt of calms, to the typhoon-swept China seas, and the blinding dust-storms of the north of that great empire. It includes some of the highest table-lands and some of the mightiest mountains, as well as extensive plains scarcely above sea level.

This being the case, one is driven at once to ask the question whether, if over such diverse regions leprosy is rife, climate can have anything to do with the disease.

The temperate region.—The temperate region in China may roughly be taken as the country north of the Yangtse River, having a mean annual temperature of about 60° F. It is continental in type, the summer temperature at Pekin, for example, averaging 79° F. for the three summer months, and as low as 27° for the three winter months. It is a dry region, even the coast of Shantung only receiving about 25 inches of rain annually; and as we go west the dryness increases, till west of Peking the country is semi-desert. This is owing to the steady desiccation which Central and Eastern Asia is undergoing from secular causes, and to the cutting off of the rain-bearing monsoons by the mountains which divide the basin of the Yangtse from that of the Hwang-ho.

Manchuria and Korea exhibit the same continental conditions, but the latter enjoys a heavier rainfall.

Leprosy is endemic in Shantung, but not in Chihli. It is not endemic in South Manchuria, but is again found in Southern Korea; but nowhere throughout this temperate region does it attain the virulence it assumes in the tropical provinces of Kwantung and Fokien.

If we ask what has determined the sporadic character of leprosy in this region, we are at once brought face to face with the fact that it occurs in two places having most marked contrasts. Shantung is a land of plains, for its mountains are either unpeopled, or the inhabitants are free from leprosy. Korea, on the other hand, is entirely moun-

tainous, and is quite free from loprosy in the north, where the plains occur. Again, Shantung is the driest, and Korea the wettest part of the region. Shantung has an evil reputation for malaria; but this is only in parts where the Hwang-ho has a habit of bursting its banks, and putting the country under water. Shantung as a whole is salubrious, and its evil reputation is rather emphasised in the native mind in consequence of the general healthiness of the province. Korea is quite as malarious as any part of Shantung.

We must look elsewhere than to climatic conditions to find a clue to the sporadic character of leprosy in the temperate region.

The tropical region.—I separate this from the equatorial because of its marked individuality. It includes all the area between the temperate region and, say, latitude 12° N.

It is marked by distinctly tropical summers, with the wet season during the hot weather, and by strongly marked seasons. The summers are not hotter than in the north, but are much moister; and the winters are cool, though frost is of rare occurrence. It is the region of typhoons.

This region includes all South China, Cochin China, and the Philippines, which latter have peculiarities of their own, rendering them more allied to the equatorial region. The rainfall is heavy, ranging from 60 inches to 160. It contains wide plains, high mountains, and the vegetation varies from almost desert, as on the coast of Kwantung, to dense tropical forest and jungle in Cochin.

Leprosy is endemic over most of it, and here again we see the disease sporadic. It is found in an isolated centre in the mountain province of Szechuen, and missing over the rest of the province. It is rare in all the other provinces except Kwantung and Fokien, where it swarms. It is found in less marked intensity through Cochin, and is endemic in the Philippines.

The great alluvial plain of the Si-kiang, with the vast population of Canton, and the hills and mountains, are alike the seat of leprosy in Kwantung and Fokien, and nowhere is it more rife. It occurs again, but in greatly diminished force, in the central plain of the Yangtse, but is absent from

the equally great and as densely peopled Yangtse plain of the east. Neither mountain nor plain affects it. The forest region of Cochin nurtures it, the forest region of Szechuen does not. The swampy rice-fields of Kwantung are a hot-bed of it, the swampy rice-fields of other places are not. Of this we may be certain, that Kwantung and Fokien, and the vicinity of their coasts especially, are the chief centre of leprosy in all the great empire of China. Yet it is not the sea which is the determining cause of leprosy, for long stretches of coast even in China are untainted. Climate, again, offers no solution of the question.

The equatorial region.—For a detailed account of this region see the introductory remarks to the article on the Straits Settlements. It is characterised by an almost complete absence of climatic contrasts. Air, soil, and water have a uniform temperature bordering on 80° F.; the day and night temperatures vary but a few degrees, and there is no appreciable difference of season. Everything reeks with moisture, and few storms stir the atmosphere. It is essentially the region of primeval forests. It includes all the land within twelve degrees of the equator.

Every variety of surface diversifies it, from high mountains to wide plains, but it is a region of islands, and not continental. The Malay Peninsula, the Archipelago, and many islands in the Pacific lie within it.

Over this vast and diversified area common opinion believes leprosy to have laid its foul hand, and even official reports contain such remarks as the following, from the pen of the Netherlands Minister for the Colonies:—"It may, however, be stated that the disease appears in all parts of the Indian Archipelago except the little Sunda Islands and the northern part of Celebes." But when we come to sift the evidence the picture is not so dark as has been painted. To stamp each island as leprous because a leper has been seen there is to raise needless alarm. On the same false principle we should have to speak of health resorts as the most unhealthy of places because there is most sickness there. Ventnor and Penzance would thus be called the death-traps of England, and the Consumption Hospital the incubating house of phthisis.

"Except the little Sunda Islands," says the Minister, but what an exception! They extend over fifteen degrees of longitude, or say a thousand miles, or the distance between London and Naples. Still it is only too true that the disease is very wide-spread, and the Straits Settlements, Java, Sumatra, the Moluccas, and most of Celebes are leprous, and Borneo also to a lesser extent.

Yet, again, we meet with the same independence of leprosy upon climate. If any part of the world could be selected in which all the conditions for the favourable cultivation of the leprosy bacillus were favourable, one would choose the equatorial region, with its continual moist heat and rank vegetation. Yet it is not the hotbed of the disease. Nowhere is it to be found so virulent as in Kwantung and Fokien, and even the unhappy Hawaiians belong not to this, but to the tropical region. Leprosy is rare in Java, not very prevalent in Sumatra, and its chief seat in the region seems to be in the Moluccas.

So far as climate is concerned this is the most uniform of regions, yet we do not find leprosy equally distributed over it, and long stretches are quite free from it. Again, it is found in South but not in North Celebes, a fact which we shall recur to further on. Nothing shows that elevation has any influence, for lepers are found alike on the hills and the plains.

It may confidently be affirmed that leprosy is not dependent upon, nor even influenced by, climate in any portion of the area dealt with in this report.

2. *Geology.*

It is unnecessary, even if it were possible, to describe the geological features of this great area in even a general sketch.

In China we have mountain and hill regions having a granitic core, over which are laid extensive beds of Archæan schists and limestones, slates, and sandstones. The greater part of the empire is covered with rocks of Carboniferous age, vast areas being composed of mountain limestone and coal-measures. Next in importance to these are the extensive post-Tertiary sands and loess which form the Great Plain.

Similar rocks (with the exception of loess) are found in the Malay Peninsula, Borneo, and Sumatra, and in the two latter thick beds of Tertiary sandstone abound.

Volcanic rocks are illustrated on the grandest scale in Java, the lesser Sunda Islands, the Moluccas, and the Philippines.

The Pacific is equally rich in volcanic rocks, and is, in fact, entirely composed of them or of coral. The continental island of New Caledonia is an exception.

We have thus every possible formation, or rather every kind of rock, amply illustrated. On the one hand are the deadly mangrove swamp, the bright coral strand, the alluvium of mighty rivers, and the loess, to illustrate modern formations. Granite, as in Kwantung, Fokien, and Shantung, are examples of plutonic rocks; the volcanic series is nowhere better developed, and ordinary sedimentary rocks take the ground over many thousands of square miles. Yet this variety bears no relation to the distribution of leprosy.

Decomposing granite has, in the East, many charges brought against it as a seed-bed of disease. I have never been able to see the faintest evidence in this direction. It is true that the coasts of Kwantung and Fokien are chiefly granitic, and that they are the most leprous of places. It is true that leprosy crops up again in Shantung, where granite is found. But leprosy in its intensest form is as rife on the Carboniferous rocks and on the modern alluvium of Kwantung as on the granite; and in Shantung the comparatively mild leprosy is spread over the modern loess and marine sands even more than over the small granite area.

North Celebes is free from leprosy, while South Celebes is tainted; and the former is volcanic, the latter is not. Here, if we only had limited knowledge, we might trace a connection between the rocks and the disease. But the Moluccas, where the severest form of leprosy in the Archipelago is said to occur, is entirely volcanic; and so are the Sandwich Islands. There is no practical geological difference between the geological structure of Sumatra and Java, where leprosy exists, and the lesser Sunda Islands, where it does not.

In fine, I have no hesitation in saying that geological structure does not exercise the slightest influence over the distribution of leprosy.

3. *Ethnology.*

The ethnology of the area here treated of is very interesting, and is illustrated by a sketch map. It embraces most of the chief races, the Caucasian, the Mongolic, the Negroid, and the Indonesian. The following table exhibits—

A. *Mongolic.*

(1) *Mongolian :*
Chinese.
Siamese.
Shans.
Laos.
Annamese.
Burmese.

(2) *Malay :*
Malay proper.
Tagalas and Bisayans of the Philippines.

B. *Caucasic.*

Natives of Cambodia and Champa.
Klings from Madras.

C. *Indonesian.*

Battaks, Kubus, and Passumahs of Sumatra.
Mantawi Islanders.
Most Dyak tribes.
Buludupies of North Borneo.
Indigenes of Celebes.
Galelas of Jilolo.
Many tribes in Buru, Ceram, Savu, Roti, &c.
Some tribes in the Philippines.
Red-haired tribe of East Timor.
Polynesians of Samoa, Tahiti, Hawaii, Tonga, &c.

D. *Negroid.*

(1) *Negritoes :*
Aetas of Philippines.
Sakais of Malay Peninsula.
Karons of New Guinea.
Badui and Kalongs of Java.

(2) *Papuans :*
Generally distributed from Flores to Fiji.

The waves of life which have passed over this part of the earth cannot yet be determined in detail, but the general facts are as follows :—Originally the entire area, except perhaps the Eastern Pacific, was peopled by the black race that has since diverged into two varieties, the Negritoes and the Papuans. Then the brown race, of whom the Malays are considered the type, appeared on the scene, but not as true Malays. The immigrants who have been styled pre-Malays, and are now spoken of as Indonesians, have strong affinities with the fair Caucasic stock, and are probably a fusion of Mongolic with Caucasic elements. Next, the true Malays spread from their birthplace, and about the second century B.C. a wave of Buddhism and Brahminism affected the Archipelago, leaving traces in Cambodia, Java, Borneo, and as far east as Moluccas. In the thirteenth century Islam began to spread, and at the same time the Chinese began to push southwards. Then followed the Portuguese, Spaniards, Dutch, and English.

The area is therefore a complex one to deal with ethnologically, yet if the appended ethnographic chart and that showing the distribution of leprosy be compared, certain broad facts become apparent.

The first point is that leprosy is absent from the area occupied by the Negroid races, with two exceptions. Thus it is absent from the lesser Sunda Islands, most of the New Guinea group (?), also from the Caroline Islands, the Solomons, and the New Hebrides. But it is present in part of New Caledonia and Fiji. In other words, it is absent from all the area in which plantations, or Chinese intercourse, is

also absent, and crops up where European or Chinese influence holds sway.

If we take the Indonesian area the same fact comes to light. Leprosy is practically absent from the whole of Borneo, save where the Chinese have settled. In Sumatra the Indonesian area, again, is free from leprosy so far as these people are concerned, though I have coloured the whole island as leprous because cases occur in most districts, though the aborigines are free from the disease. So, too, Timor, with its mixed Papuan and Malay population, and even with a small Indonesian element, is free.

It is not till we come to the Chinese and Malay localities that leprosy marks itself strongly on the land, and the universal testimony is that it is the Chinese who are the greatest sufferers, and that the Malays are little affected by it. Every hospital, whether in Borneo, Sumatra, or Java, tells the same tale ; the Malay patients are few, the Chinese form the bulk of the lepers. This I believe to be the case also in the Moluccas, though I have few data to go upon. I certainly never saw a native leper there.

If we turn to the Pacific Ocean we find three centres of leprosy—New Caledonia, where it is rare ; Fiji, where it is very rare ; and Hawaii, where it attains a virulence more intense than in Kwantung. Now what do these facts show ? They tell the same story that leprosy has spread with the incoming of foreign races. In the case of Hawaii, though much has been written to the contrary, I think no unprejudiced person can weigh the evidence which is given in detail in the report on those islands, and doubt for a moment that leprosy was brought by the Chinese. I have shown this to have been the case in North Borneo, it is the common belief in Sumatra and Java, and even in the Malay Peninsula we find most of the lepers are Chinese ; the Malays are affected but to a slight extent, and the aborigines not at all, with one doubtful but remarkable exception, the Sakais of Muar ; and Muar, be it remembered, is on the frontier of Malacca—the oldest European settlement in this part of the East.

Reviewing the evidence from an anthropological point of view, it seems to me that certain broad facts may be taken

as fairly well established, though it is highly desirable to obtain further information, especially in the Pacific.

The almost complete immunity of the region occupied by the Negroid races, and the almost equally marked immunity of the Indonesians, the two oldest races in the area, seem to show that leprosy is not indigenous to the Archipelago or the Pacific, but has been introduced recently.

Next, the fact that the Malays suffer so little in comparison with the Chinese, and, moreover, only where the Chinese have settled, shows that it is to the Chinese and not to the Malays that the spread of leprosy is due.

I would here make another suggestion. The Chinese have visited Borneo for the last six hundred years, and many settled permanently in the north and west, and have fused with the native tribes, yet leprosy is unknown there; and much the same thing has happened in other parts of the Archipelago, no evil results having been felt. If it be asked why this immunity, perhaps an answer may be found in this suggestion. There is a great difference between voluntary immigrants and forced immigration. The Chinese who in early days came to Borneo came to trade, and were by no means of the coolie class, and therefore were not likely to be lepers.

The coolie traffic, though better than it used to be, is still a disgraceful business, savouring far more of slave-dealing and the pressgang than of volunteering. I have seen much of it, and have travelled in coolie ships, and I know how they are obtained, and how treated. It is these poor wretches, picked up from the wasters of the Chinese poor, who form the bulk of the coolie class, and it was when they were introduced into Borneo that leprosy appeared.

The free emigrating Chinaman never went to a native island as a coolie; he went as a trader or planter,—as a master, and not as a slave. It was not till forced labour (called by a milder term) was introduced by the Portuguese, the Dutch, the Spaniards, and latterly by the English, that leprosy began to spread; and on this suggestion the peculiarities of its distribution receive a natural and sufficient explanation.

To sum up these remarks, I come to the following conclusions :

(1) Leprosy is not dependent upon climate.

(2) Leprosy is independent of geological structure.

(3) Leprosy shows a marked avoidance of the Negroid and Indonesian races.

(4) Leprosy is most common among the Chinese, and much less so among the Malays.

(5) Leprosy has only spread where European plantations or other industries have been started.

(6) The Europeans certainly did not introduce it; the Malays could hardly have done so; the Chinese coolie could easily have brought it.

(7) Kwantung and Fokien are the hotbeds of leprosy, and the chief recruiting ground for coolies.

Finally, I think Mr. Cantlie's suggestion that the Chinese have spread leprosy through the greater part of these regions might be stated much more strongly than he has seen fit to do.

NOTES ON LEPROSY IN HONG KONG.

Extract from a pamphlet published in 1890 *on "Leprosy in Hong Kong,"* by JAMES CANTLIE, M.B., F.R.C.S.

(Leprosy prevalent. Imported.)

THE island of Hong Kong is geographically part of the Province of Kwantung, and its meteorological conditions are identical with this region (see page 55).

It consists of lofty granite peaks rising in several instances over 1500 feet, with an abrupt fall to the sea. Until annexed to the British Crown in 1841, it was but sparsely inhabited, so that the endemicity of leprosy cannot be ascertained. Since that date, however, the port has been open to Chinese of all classes, and by no section of the community has this hospitality been more readily embraced than by the leprous from the mainland of China.

It was not possible, until the Alice Memorial Hospital was opened, for European doctors to study scientifically the diseases of the natives; therefore, it is only since the opening of that hospital in February, 1887, that any opportunity of ascertaining the prevalence of leprosy has been afforded.

From February, 1887, to August, 1889, *i. e.* two and a half years, 125 lepers presented themselves for treatment at the Alice Memorial Hospital.

It must be borne in mind that this cannot represent all the lepers present in Hong Kong during that period.

Up to fourteen years ago, leper families and communities settled on the hill-sides above the town of Victoria, Hong Kong, and obtained a livelihood as best they could. Three or four collections of huts occupied by lepers existed at this time, and there they had maintained themselves from the earliest days of the occupation of the island. About the date mentioned the lepers were disturbed in their

retreats, and expelled to the mainland. Since then no collection of lepers has been allowed in Hong Kong, and the orders concerning them are precise, viz. that whenever a suspected leper is reported the police shall arrest him; that he is to be detained until the Colonial Surgeon pronounces upon him, when, should he prove leprous, he is sent away to the mainland.

How the Chinese regard Leprosy.

A table of questions submitted to two Chinese doctors of the Tung Wa (native) Hospital. The answers were obtained for me by the kindness of the Acting Registrar General, The Hon. N. G. Mitchell-Innes, Esq.

I. What is the Chinese name for leprosy?—Ma Fung.

II. Do you recognise different varieties; if so, what names are assigned to them?—There are eight mild, curable varieties (of the nature of ringworm), viz.: 1. Hung Wan, red patches (local macular?); 2. Hak Wan, black patches. 3. Hung Tün, red rings. 4. Pàk Tün, white rings. 5. Tsz Wan, darker than No. 1. 6. Lau Tài, contraction of sinews of feet. 7. Tün Chi, contraction of sinews of fingers. 8. Kai Chàu Tung (tubercular?).

As with the Israelites of old, so with the Chinese, the name "false leprosy" was applied to most of the ringworm (tinea) diseases, so very common amongst both peoples. According to the Book of Leviticus it was only by the most careful and prolonged examination by the priest that leprosy and ringworm were distinguished, and during the process the person was segregated, until pronounced upon. The Chinese distinguished false leprosy as a "curable" variety, and it is in this way we hear of cures in this as in many other diseases by wonderful Chinese nostrums. But the Chinese know well the differences between the two, and are fully alive to the fact that leprosy is incurable.

III. Is leprosy considered contagious, infectious, and hereditary?—Both contagious and infectious, also hereditary, disappearing in the third or fourth generation.

The belief that leprosy disappears in the third or fourth generation is universal throughout China. It would seem as though the wording of the second commandment, "and visit the sins of the fathers upon the children unto the third and fourth generation," contained a threat with a possibility of finality; and this observation by the Chinese of the disappearance in the third or fourth generation is interesting in connection with the wording of the commandment.

IV. Do the Chinese "public" recognise leprosy as a contagious disease?—Yes! and as infectious also.

V. Are they afraid of people who have the disease living with them?—Yes! they would not permit a leper, even if the son of rich parents, to remain in their neighbourhood.

VI. Do cases of leprosy arise in Hong Kong?—Possibly. The majority of cases are, however, introduced from China.

VII. From what district on the mainland do most lepers come?—No district suffers more than another.

VIII. From what do the Chinese consider leprosy to arise?—An excess of moisture in the phlegm.

IX. Is leprosy considered curable?—No.

X. How do you treat leprosy?—Efforts are made to drive the leprous matter to one part of the body, so as to save the rest.

XI. When the doctors at the Tung Wa meet with a case, what do they do with it?—Refuse to receive it.

XII. Do many cases of leprosy present themselves at the Tung Wa?—Very few.

XIII. Do you take any steps to send the person back to the mainland?—No.

XIV. Is there any provision in Hong Kong for dealing with lepers?—Lepers are sent to Canton to be placed in the leper village there.

XV. What would you propose as the best method of dealing with lepers in Hong Kong?—Send them to the leper village in Canton, to which the authorities can, and do, compel all lepers to go.

XVI. Is it considered advisable for the Government of Hong Kong to deal with the question of segregation?—A leper home in Hong Kong would probably lead to an influx of lepers.

XVII. Does the Government of China provide officially for the segregation of lepers ?—Every district in China has its leper home, the inmates of which receive an allowance from the Government, and have land to till.

Sex.

The relative frequency as to the sex of lepers in the cases I have met with agrees with the reports all over the world, namely, that more males are attacked than females. Out of 125 cases only thirteen females, or 10·4 per cent., is amongst the lowest proportion of females to males recorded. All observers agree that there is no reason to believe that there are fewer women than men attacked, but the circumstance occurring time after time seems surely to establish the fact. From Norway, Barbadoes, British Guiana, &c., come the same accounts.

In Hong Kong the relative numbers are out of all proportion, and the fact is difficult to account for except on general principles, viz. the rooted aversion of Chinese women to see "foreign doctors," and the custom prevailing in China of keeping women in close confinement so as to be unseen by anyone. Still there is more in it than that, as the following analysis shows.

Out of 18,000 patients at the Alice Memorial Hospital, in round numbers, 15,000 were males and 3000 females—five males to one female, or one female in six. Taking this as our guide for the number of lepers which ought to have been met with on the footing of averages, we should have had one sixth of the 125 lepers, females ; in other words, about twenty cases, or 16·6 per cent. The actual number falls considerably short of this, however, giving 10·4 per cent. only.

The Age of Lepers.

The average age of lepers, as ascertained from 125 cases, was 36·3 years.

The youngest patient seen was six years old, the oldest seventy-five.

Leprosy is met with, according to other observers, at as early an age as three years. In leper asylums the children

of leper parents are reputed to develop the disease at still earlier periods.

The ages according to decades are as follows :

From 0—10.	From 10—20.	From 20—30.	From 30—40.	From 40—50.	From 50—60.	From 60—70.	From 70—80.
4	7	32	43	18	15	5	1
3·2 %	5·6 %	25·6 %	34·4 %	14·4 %	12 %	4 %	·8 %

Between the ages of twenty and forty, 60 per cent. of the cases occur.

Occupation of Lepers.

The occupation of the lepers met with was ascertained to be as follows :

Coolies	49
Hawkers	12
Cooks	8
Carpenters	7
House coolies	6
Masons	5
Schoolboys	5
Chair coolies	3
Sailors	3
Farmers	3
Silversmiths	3
Butchers	2
Shopkeepers	2
Teachers	2
Silk-weaver	1
Barber	1
Fishmonger	1
Shoemaker	1
Clerk	1
Watchman	1
Unemployed (beggars chiefly)	9
	125

From the perusal of this list, it is seen that leprosy is not confined to any one trade or employment, nor is it more prevalent among one class than another. The number of coolies attacked is explained by the fact that they form more than 50 per cent. of all patients presenting themselves at hospital. As regards hawkers also, lepers frequently take to selling their wares in the streets, owing to being driven out of house and home by their relations.

Leprosy, therefore, may attack persons engaged at any trade or occupation at any age beyond the third year.

Leprosy as it affects Hong Kong.

By far the most important fact in connection with leprosy in China is that the majority of coolie emigrants start from the British port of Hong Kong. In these pages one fact has stood out more prominently than any other, namely, that the coolie emigrants from the provinces of Kwantung and Fokien are the carriers of leprosy wherever they go. It follows, therefore, that as Hong Kong is the usual port of embarkation for these coolies, that it is the chief distributing centre of leprosy in these regions.

A great responsibility therefore rests upon the Government of Hong Kong. If not legally compelled to interfere, surely a moral duty is incumbent upon the ruling power under whose control is the cleansing of this foul region. Were the harbour authorities in Hong Kong fully alive to the importance of their trust, as regards the health of countries with whom they are in touch, there would be less leprosy in the Pacific.

The diagnosis of leprosy in the early stages is not easy ; and latent leprosy, unrecognisable at the port of embarkation, will no doubt appear with aggravated rapidity under the miserable hygienic conditions to which coolies, on plantations in countries on the Pacific littoral, are subjected. A closer inspection, however, would undoubtedly reveal many men in the initial stages of leprosy about to start as emigrants.

Were the European nations who trade in the Far East to combine in an effort to obtain a more thorough medical inspection of coolie-laden ships about to depart from the

ports of leprosy-stricken Kwantung and Fokien, a speedy diminution of lepers would be reported from the countries now infested by them.

Finally, as almost all vessels from Chinese ports pass through Hong Kong, the Government, through its harbour department, ought to insist on a careful medical inspection of all ships carrying coolies before they are allowed to leave British waters.

PRINTED BY ADLARD AND SON,
BARTHOLOMEW CLOSE, E.C., AND 20, HANOVER SQUARE, W.

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1916.